Science

Effective November 2021 Rule 6A-1.09412, F.A.C.

Science - Grade K (#5020010) 2015 - 2022 (current)

Name	Description	
SC.K.E.5.1:	Explore the Law of Gravity by investigating how objects are pulled toward the ground unless something holds them up.	
SC.K.E.5.2:	Recognize the repeating pattern of day and night.	
SC.K.E.5.3:	Recognize that the Sun can only be seen in the daytime.	
SC.K.E.5.4:	Observe that sometimes the Moon can be seen at night and sometimes during the day.	
SC.K.E.5.5:	Observe that things can be big and things can be small as seen from Earth.	
SC.K.E.5.6:	Observe that some objects are far away and some are nearby as seen from Earth.	
SC.K.L.14.1:	Recognize the five senses and related body parts.	
SC.K.L.14.2:	Recognize that some books and other media portray animals and plants with characteristics and behaviors they do not have in real life.	
SC.K.L.14.3:	Observe plants and animals, describe how they are alike and how they are different in the way they look and in the things they do.	
SC.K.N.1.1:	Collaborate with a partner to collect information.	
SC.K.N.1.2:	Make observations of the natural world and know that they are descriptors collected using the five senses.	
SC.K.N.1.3:	Keep records as appropriate such as pictorial records of investigations conducted.	
SC.K.N.1.4:	Observe and create a visual representation of an object which includes its major features.	
SC.K.N.1.5:	Recognize that learning can come from careful observation.	
SC.K.P.8.1:	Sort objects by observable properties, such as size, shape, color, temperature (hot or cold), weight (heavy or light) and texture.	
SC.K.P.9.1:	Recognize that the shape of materials such as paper and clay can be changed by cutting, tearing, crumpling, smashing, or rolling.	
SC.K.P.10.1:	Observe that things that make sound vibrate.	
SC.K.P.12.1:	Investigate that things move in different ways, such as fast, slow, etc.	
SC.K.P.13.1:	Observe that a push or a pull can change the way an object is moving.	
MAFS.K.MD.1.2:	Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the	
	difference. For example, directly compare the heights of two children and describe one child as taller/shorter.	
IVIAFS.K.IVID.2.3:	Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.	
	wake sense of problems and persevere in solving them.	
MAFS.K12.MP.1.1:	pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.	
	Standard Relation to Course: Supporting	
	Reason abstractly and quantitatively.	
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.	
	Construct viable arguments and critique the reasoning of others.	
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.	
	Standard Relation to Course: Supporting	
	Nodel with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional	
MAFS.K12.MP.4.1:	reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are	

	able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose. Standard Relation to Course: Supporting
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Look for and express regularity in repeated reasoning
MAFS.K12.MP.8.1:	Evolvitor and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
LAFS.K.RI.1.1:	with prompting and support, ask and answer questions about key details in a text.
LAFS.K.RI.2.4:	with prompting and support, ask and answer questions about unknown words in a text.
LAFS.K.RI.4.10:	Actively engage in group reading activities with purpose and understanding.
LAFS.K.SL.1.1:	 a. Follow agreed-upon rules for discussions with diverse partners about <i>kindergarten topics</i> and texts with peers and adults in small and larger groups. b. Continue a conversation through multiple exchanges.
LAFS.K.W.3.8:	With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
HE.K.C.1.5:	Recognize there are body parts inside and outside of the body. Clarifications: Brain, muscles, and skin.

GENERAL NOTES

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

1. Ensuring wide reading from complex text that varies in length.

2. Making close reading and rereading of texts central to lessons.

3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.

- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 5020010

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades PreK to 5 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: SCIENCE GRADE K Course Length: Year (Y) Course Attributes: • Class Size Core Required

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): K

Educator Certifications

Primary Education (K-3)
Prekindergarten/Primary Education (Age 3 through Grade 3)
arly Childhood Education (Early Childhood)
Ilementary Education (Elementary Grades 1-6)
lementary Education (Grades K-6)

Science - Grade K (#5020010) 2022 - And Beyond

Name	Description		
SC.K.E.5.1:	Explore the Law of Gravity by investigating how objects are pulled toward the ground unless something holds them up.		
SC.K.E.5.2:	Recognize the repeating pattern of day and night.		
SC.K.E.5.3:	Recognize that the Sun can only be seen in the daytime.		
SC.K.E.5.4:	Observe that sometimes the Moon can be seen at night and sometimes during the day.		
SC.K.E.5.5:	Observe that things can be big and things can be small as seen from Earth.		
SC.K.E.5.6:	Observe that some objects are far away and some are nearby as seen from Earth.		
SC.K.L.14.1:	Recognize the five senses and related body parts.		
SC.K.L.14.2:	Recognize that some books and other media portray animals and plants with characteristics and behaviors they do not have in real life.		
SC.K.L.14.3:	Observe plants and animals, describe how they are alike and how they are different in the way they look and in the things they do.		
SC.K.N.1.1:	Collaborate with a partner to collect information.		
SC.K.N.1.2:	Make observations of the natural world and know that they are descriptors collected using the five senses.		
SC.K.N.1.3:	Keep records as appropriate such as pictorial records of investigations conducted.		
SC.K.N.1.4:	Observe and create a visual representation of an object which includes its major features.		
SC.K.N.1.5:	Recognize that learning can come from careful observation.		
SC.K.P.8.1:	Sort objects by observable properties, such as size, shape, color, temperature (hot or cold), weight (heavy or light) and texture.		
SC.K.P.9.1:	Recognize that the shape of materials such as paper and clay can be changed by cutting, tearing, crumpling, smashing, or rolling.		
SC.K.P.10.1:	Observe that things that make sound vibrate.		
SC.K.P.12.1:	Investigate that things move in different ways, such as fast, slow, etc.		
SC.K.P.13.1:	Observe that a push or a pull can change the way an object is moving.		
	Mathematicians who participate in effortful learning both individually and with others:		
	Analyze the problem in a way that makes sense given the task.		
	Ask questions that will help with solving the task.		
	Build perseverance by modifying methods as needed while solving a challenging task.		
	 Stay engaged and maintain a positive mindset when working to solve tasks. 		
	Help and support each other when attempting a new method or approach.		
MA.K12.MTR.1.1:	Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.		
	Demonstrate understanding by representing problems in multiple ways		
	 Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. 		
MA.K12.MTR.2.1:	Choose a representation based on the given context or purpose.		
	Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.		
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:		
	 Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. 		
	 Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used. 		
	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:		

MA.K12.MTR.4.1:	 Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	 Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations.
	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently.
FLΔ K12 FE 2 1.	Clarifications

	See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension.
	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
	Recognize there are body parts inside and outside of the body.
HE.K.C.1.5:	Clarifications: Brain, muscles, and skin.

GENERAL NOTES

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 5020010

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades PreK to 5 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: SCIENCE GRADE K Course Length: Year (Y) Course Attributes: • Class Size Core Required

Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): K

Educator Certifications

Primary Education (K-3) Prekindergarten/Primary Education (Age 3 through Grade 3) Early Childhood Education (Early Childhood) Elementary Education (Elementary Grades 1-6) Elementary Education (Grades K-6)

Science Grade One (#5020020) 2015 - 2022 (current)

Name	Description
SC.1.E.5.1:	Observe and discuss that there are more stars in the sky than anyone can easily count and that they are not scattered evenly in the sky.
SC.1.E.5.2:	Explore the Law of Gravity by demonstrating that Earth's gravity pulls any object on or near Earth toward it even though nothing is touching the object.
SC.1.E.5.3:	Investigate how magnifiers make things appear bigger and help people see things they could not see without them.
SC.1.E.5.4:	Identify the beneficial and harmful properties of the Sun.
SC.1.E.6.1:	Recognize that water, rocks, soil, and living organisms are found on Earth's surface.
SC.1.E.6.2:	Describe the need for water and how to be safe around water.
SC.1.E.6.3:	Recognize that some things in the world around us happen fast and some happen slowly.
SC.1.L.14.1:	Make observations of living things and their environment using the five senses.
SC.1.L.14.2:	Identify the major parts of plants, including stem, roots, leaves, and flowers.
SC.1.L.14.3:	Differentiate between living and nonliving things.
SC.1.L.16.1:	Make observations that plants and animals closely resemble their parents, but variations exist among individuals within a population.
SC.1.L.17.1:	Through observation, recognize that all plants and animals, including humans, need the basic necessities of air, water, food, and space.
SC.1.N.1.1:	Raise questions about the natural world, investigate them in teams through free exploration, and generate appropriate explanations based on those explorations.
SC.1.N.1.2:	Using the five senses as tools, make careful observations, describe objects in terms of number, shape, texture, size, weight, color, and motion, and compare their observations with others.
SC.1.N.1.3:	Keep records as appropriate - such as pictorial and written records - of investigations conducted.
SC.1.N.1.4:	Ask "how do you know?" in appropriate situations.
SC.1.P.8.1:	Sort objects by observable properties, such as size, shape, color, temperature (hot or cold), weight (heavy or light), texture, and whether objects sink or float.
SC.1.P.12.1:	Demonstrate and describe the various ways that objects can move, such as in a straight line, zigzag, back-and-forth, round-and-round, fast, and slow.
SC.1.P.13.1:	Demonstrate that the way to change the motion of an object is by applying a push or a pull.
	Understand how to use a ruler to measure length to the nearest inch.
	a. Decognize that the ruler is a tool that can be used to measure the attribute of length
	 b. Understand the importance of the zero point and end point and that the length measure is the span between two points.
IVIAFS. L.IVID. L.d.	b. Orderstand the importance of the zero point and end point and that the rength measure is the span between two points. c. Decognize that the units marked on a ruler have equal length intervals and fit together with no gaps or overlaps. These equal interval distances
	can be counted to determine the overall length of an object.
MAFS.1.MD.3.4:	Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
	Construct viable arguments and critique the reasoning of others.
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct even
	though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies.

	Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments
	Standard Relation to Course: Supporting Model with mathematics
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
LAFS.1.RI.1.1:	Ask and answer questions about key details in a text.
LAFS. 1. RI.2.4:	Ask and answer questions to help determine or clarify the meaning of words and phrases in a text.
LAFS.1.KI.4. IU:	Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups. a. Follow agreed-upon rules for discussions (e.g., listening to others with care, speaking one at a time about the topics and texts under discussion). b. Build on others' talk in conversations by responding to the comments of others through multiple exchanges. c. Ask questions to clear up any confusion about the topics and texts under discussion.
LAFS.1.W.3.8:	With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
HE.1.C.1.5:	Identify the correct names of human body parts. Clarifications: Stomach, intestines, heart, lungs, skin, muscles, and bones.

VERSION DESCRIPTION

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- · Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

English Language Development (ELD) Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number E020020	Courses > Grade Group: Grades PreK to 5 Education
Course Number: 5020020	Courses > Subject: Science > SubSubject: General
	Sciences >
	Abbreviated Title: SCIENCE GRADE ONE
	Course Length: Year (Y)
	Course Attributes:
	Class Size Core Required
Course Type: Core Academic Course	
Course Status: Course Approved	
Grade Level(s): 1	

Educator Certifications

Elementary Education (Elementary Grades 1-6)
Science (Elementary Grades 1-6)
Primary Education (K-3)
Prekindergarten/Primary Education (Age 3 through Grade 3)

Science Grade One (#5020020) 2022 - And Beyond

Name	Description
SC.1.E.5.1:	Observe and discuss that there are more stars in the sky than anyone can easily count and that they are not scattered evenly in the sky.
SC.1.E.5.2:	Explore the Law of Gravity by demonstrating that Earth's gravity pulls any object on or near Earth toward it even though nothing is touching the object.
SC.1.E.5.3:	Investigate how magnifiers make things appear bigger and help people see things they could not see without them.
SC.1.E.5.4:	Identify the beneficial and harmful properties of the Sun.
SC.1.E.6.1:	Recognize that water, rocks, soil, and living organisms are found on Earth's surface.
SC.1.E.6.2:	Describe the need for water and how to be safe around water.
SC.1.E.6.3:	Recognize that some things in the world around us happen fast and some happen slowly.
SC.1.L.14.1:	Make observations of living things and their environment using the five senses.
SC.1.L.14.2:	Identify the major parts of plants, including stem, roots, leaves, and flowers.
SC.1.L.14.3:	Differentiate between living and nonliving things.
SC.1.L.16.1:	Make observations that plants and animals closely resemble their parents, but variations exist among individuals within a population.
SC.1.1.17.1:	Through observation, recognize that all plants and animals, including humans, need the basic necessities of air, water, food, and space.
SC.1.N.1.1:	Raise questions about the natural world, investigate them in teams through free exploration, and generate appropriate explanations based on those explorations.
SC.1.N.1.2:	Using the five senses as tools, make careful observations, describe objects in terms of number, shape, texture, size, weight, color, and motion, and compare their observations with others.
SC.1.N.1.3:	Keep records as appropriate - such as pictorial and written records - of investigations conducted.
SC.1.N.1.4:	Ask "how do you know?" in appropriate situations.
SC.1.P.8.1:	Sort objects by observable properties, such as size, shape, color, temperature (hot or cold), weight (heavy or light), texture, and whether objects sink or float.
SC.1.P.12.1:	Demonstrate and describe the various ways that objects can move, such as in a straight line, zigzag, back-and-forth, round-and-round, fast, and slow
SC.1.P.13.1:	Demonstrate that the way to change the motion of an object is by applying a push or a pull.
	Mathematicians who participate in effortful learning both individually and with others:
	Analyze the problem in a way that makes sense given the task.
	Ask questions that will help with solving the task.
	Build perseverance by modifying methods as needed while solving a challenging task.
	Stay engaged and maintain a positive mindset when working to solve tasks.
	Help and support each other when attempting a new method or approach
MA.K12.MTR.1.1:	 Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:
MA.K12.MTR.2.1:	 Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose.
	Clarifications:
	 Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:
	 Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations.
	 Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.

	 Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
MA.K12.MTR.4.1:	 Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:
	 Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	 Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
	Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA K12 MTR 7 1-	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
	 Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
ELA.K12.EE.1.1:	 K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide
	referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation.

	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension.
	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing.
	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting. Identify the correct names of human body parts.
HE.1.C.1.5:	Clarifications: Stomach, intestines, heart, lungs, skin, muscles, and bones.

VERSION DESCRIPTION

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

English Language Development (ELD) Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades PreK to 5 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: SCIENCE GRADE ONE Course Length: Year (Y) Course Attributes: • Class Size Core Required

Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): 1

Educator Certifications

Elementary Education (Elementary Grades 1-6) Science (Elementary Grades 1-6) Primary Education (K-3) Prekindergarten/Primary Education (Age 3 through Grade 3)

page 15 of 926

Science - Grade Two (#5020030) 2015 - 2022 (current)

Name	Description	
SC.2.E.6.1:	Recognize that Earth is made up of rocks. Rocks come in many sizes and shapes.	
SC.2.E.6.2:	Describe how small pieces of rock and dead plant and animal parts can be the basis of soil and explain the process by which soil is formed.	
SC.2.E.6.3:	Classify soil types based on color, texture (size of particles), the ability to retain water, and the ability to support the growth of plants.	
SC.2.E.7.1:	Compare and describe changing patterns in nature that repeat themselves, such as weather conditions including temperature and precipitation, day to day and season to season.	
SC.2.E.7.2:	Investigate by observing and measuring, that the Sun's energy directly and indirectly warms the water, land, and air.	
SC.2.E.7.3:	Investigate, observe and describe how water left in an open container disappears (evaporates), but water in a closed container does not disappear (evaporate).	
SC.2.E.7.4:	Investigate that air is all around us and that moving air is wind.	
SC.2.E.7.5:	State the importance of preparing for severe weather, lightning, and other weather related events.	
SC.2.L.14.1:	Distinguish human body parts (brain, heart, lungs, stomach, muscles, and skeleton) and their basic functions.	
SC.2.L.16.1:	Observe and describe major stages in the life cycles of plants and animals, including beans and butterflies.	
SC.2.L.17.1:	Compare and contrast the basic needs that all living things, including humans, have for survival.	
SC.2.L.17.2:	Recognize and explain that living things are found all over Earth, but each is only able to live in habitats that meet its basic needs.	
SC.2.N.1.1:	Raise questions about the natural world, investigate them in teams through free exploration and systematic observations, and generate appropriate	
	explanations based on those explorations.	
SC.2.N.1.2:	Compare the observations made by different groups using the same tools.	
SC.2.N.1.3:	Ask "now do you know?" In appropriate situations and attempt reasonable answers when asked the same question by others.	
SC.2.N.1.4:	Explain now particular scientific investigations should yield similar conclusions when repeated.	
SC.2.N.1.5:	Explain between empirical observation (what you see, hear, reer, smeir, or taste) and ideas or interences (what you mink).	
30.2.IN. I.O.	Explain now sciencists alone of in groups are always investigating new ways to solve problems.	
SC.2.P.8.1:	attraction and repulsion of magnets	
SC.2.P.8.2:	Identify objects and materials as solid. Iiguid. or gas.	
SC.2.P.8.3:	Recognize that solids have a definite shape and that liquids and gases take the shape of their container.	
SC.2.P.8.4:	Observe and describe water in its solid, liquid, and gaseous states.	
SC.2.P.8.5:	Measure and compare temperatures taken every day at the same time.	
SC.2.P.8.6:	Measure and compare the volume of liquids using containers of various shapes and sizes.	
SC.2.P.9.1:	Investigate that materials can be altered to change some of their properties, but not all materials respond the same way to any one alteration.	
SC.2.P.10.1:	Discuss that people use electricity or other forms of energy to cook their food, cool or warm their homes, and power their cars.	
SC.2.P.13.1:	Investigate the effect of applying various pushes and pulls on different objects.	
SC.2.P.13.2:	Demonstrate that magnets can be used to make some things move without touching them.	
SC.2.P.13.3:	Recognize that objects are pulled toward the ground unless something holds them up.	
SC.2.P.13.4:	Demonstrate that the greater the force (push or pull) applied to an object, the greater the change in motion of the object.	
MAFS.2.MD.4.9:	Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.	
MAFS.2.MD.4.10:	Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart and compare problems using information presented in a bar graph.	
	Make sense of problems and persevere in solving them.	
MAFS.K12.MP.1.1:	analyze givens, constraints, relationships, and goals. They make conjectures about the form and neuring of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.	
	Standard Relation to Course: Supporting	
	Reason abstractly and quantitatively.	
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.	
	Standard Relation to Course: Supporting	
	Construct viable arguments and critique the reasoning of others.	
	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing	

MAFS.K12.MP.3.1:	arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting
MAFS.K12.MP.4.1:	Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose. Standard Relation to Course: Supporting
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
MAFS.K12.MP.7.1:	Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression x^2 + 9x + 14, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y. Standard Palation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
LAFS.2.RI.1.3:	Describe the connection between a series of historical events, scientific ideas of concepts, or steps in technical procedures in a text. Determine the meaning of words and phrases in a text relevant to a <i>grade 2 topic or subject area</i> .
LAFS 2 RI 4 10	By the end of year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 2–3 text
LAFS.2.SL.1.1:	 complexity band proficiently, with scaffolding as needed at the high end of the range. Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups. a. Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion). b. Build on others' talk in conversations by linking their comments to the remarks of others. c. Ask for clarification and further explanation as needed about the topics and texts under discussion.
LAFS.2.W.3.7:	Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).
LAFS.2.W.3.8:	Recall information from experiences or gather information from provided sources to answer a question.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.

ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
	Name healthy options to health-related issues or problems.
HE.2.B.5.2:	Clarifications: Safety equipment, peer cooperation, and communication.
	Recognize the locations and functions of major human organs.
HE.2.C.1.5:	Clarifications: The functions of the heart, lungs, and muscles.

GENERAL NOTES

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.

5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

• Asking questions (for science) and defining problems (for engineering).

- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 5020030

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades PreK to 5 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: SCIENCE GRADE TWO Course Length: Year (Y) Course Attributes: • Class Size Core Required

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 2

Educator Certifications

Elementary Education (Elementary Grades 1-6) Science (Elementary Grades 1-6) Primary Education (K-3) Prekindergarten/Primary Education (Age 3 through Grade 3) Elementary Education (Grades K-6)

Science - Grade Two (#5020030) 2022 - And Beyond

Name	Description		
SC.2.E.6.1:	Recognize that Earth is made up of rocks. Rocks come in many sizes and shapes.		
SC.2.E.6.2:	Describe how small pieces of rock and dead plant and animal parts can be the basis of soil and explain the process by which soil is formed.		
SC.2.E.6.3:	Classify soil types based on color, texture (size of particles), the ability to retain water, and the ability to support the growth of plants.		
SC.2.E.7.1:	Compare and describe changing patterns in nature that repeat themselves, such as weather conditions including temperature and precipitation, day to day and season to season.		
SC.2.E.7.2:	Investigate by observing and measuring, that the Sun's energy directly and indirectly warms the water, land, and air.		
SC.2.E.7.3:	Investigate, observe and describe how water left in an open container disappears (evaporates), but water in a closed container does not disappear (evaporate).		
SC.2.E.7.4:	Investigate that air is all around us and that moving air is wind.		
SC.2.E.7.5:	State the importance of preparing for severe weather, lightning, and other weather related events.		
SC.2.L.14.1:	Distinguish human body parts (brain, heart, lungs, stomach, muscles, and skeleton) and their basic functions.		
SC.2.L.16.1:	Observe and describe major stages in the life cycles of plants and animals, including beans and butterflies.		
SC.2.L.17.1:	Compare and contrast the basic needs that all living things, including humans, have for survival.		
SC.2.L.17.2:	Recognize and explain that living things are found all over Earth, but each is only able to live in habitats that meet its basic needs.		
SC.2.N.1.1:	Raise questions about the natural world, investigate them in teams through free exploration and systematic observations, and generate appropriate explanations based on those explorations.		
SC.2.N.1.2:	Compare the observations made by different groups using the same tools.		
SC.2.N.1.3:	Ask "how do you know?" in appropriate situations and attempt reasonable answers when asked the same question by others.		
SC.2.N.1.4:	Explain how particular scientific investigations should yield similar conclusions when repeated.		
SC.2.N.1.5:	Distinguish between empirical observation (what you see, hear, feel, smell, or taste) and ideas or inferences (what you think).		
SC.2.N.1.6:	Explain how scientists alone or in groups are always investigating new ways to solve problems.		
SC.2.P.8.1:	Observe and measure objects in terms of their properties, including size, shape, color, temperature, weight, texture, sinking or floating in water, and attraction and repulsion of magnets.		
SC.2.P.8.2:	Identify objects and materials as solid, liquid, or gas.		
SC.2.P.8.3:	Recognize that solids have a definite shape and that liquids and gases take the shape of their container.		
SC.2.P.8.4:	Observe and describe water in its solid, liquid, and gaseous states.		
SC.2.P.8.5:	Measure and compare temperatures taken every day at the same time.		
SC.2.P.8.6:	Measure and compare the volume of liquids using containers of various shapes and sizes.		
SC.2.P.9.1:	Investigate that materials can be altered to change some of their properties, but not all materials respond the same way to any one alteration.		
SC.2.P.10.1:	Discuss that people use electricity or other forms of energy to cook their food, cool or warm their homes, and power their cars.		
SC.2.P.13.1:	Investigate the effect of applying various pushes and pulls on different objects.		
SC.2.P.13.2:	Demonstrate that magnets can be used to make some things move without touching them.		
SC.2.P.13.3:	Recognize that objects are pulled toward the ground unless something holds them up.		
SC.2.P.13.4:	Demonstrate that the greater the force (push or pull) applied to an object, the greater the change in motion of the object.		
	Mathematicians who participate in effortful learning both individually and with others:		
	Analyze the problem in a way that makes sense given the task.		
	Ask questions that will help with solving the task.		
	Build perseverance by modifying methods as needed while solving a challenging task.		
	Stay engaged and maintain a positive mindset when working to solve tasks.		
MA.K12.MTR.1.1:	Heip and support each other when attempting a new method or approach.		
	Clarifications:		
	leachers who encourage students to participate actively in effortful learning both individually and with others:		
	Cultivate a continuinty of growth minuser learners. Foster persoverance in students by choosing tasks that are challenging		
	 Poster perseverance in students by choosing tasks that are chanenging. Develop students' ability to applyze and problem solve. 		
	Becognize students' effort when solving challenging problems		
	• Recognize students enore when sowing enditeringing problems.		
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:		
	Build understanding through modeling and using manipulatives.		
	Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.		
MA.K12.MTR.2.1:	Progress from modeling problems with objects and drawings to using algorithms and equations.		
	Express connections between concepts and representations.		
	Choose a representation based on the given context or purpose.		
	Clarifications:		
	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:		
	Help students make connections between concepts and representations.		
	Provide opportunities for students to use manipulatives when investigating concepts.		
	Guide students from concrete to pictorial to abstract representations as understanding progresses.		
	Show students that various representations can have different purposes and can be useful in different situations.		

	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:
MA.K12.MTR.3.1:	 Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations.
	 Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers
MA.K12.MTR.5.1:	 Develop students duing to justify includes and compare their recipiences of their peers. Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.

	Cite evidence to explain and justify reasoning.
ELA.K12.EE.1.1:	 Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9.12 Students continue with previous skills and should be aware of existing stude guides and the wave in which they differ.
	7-12 students continue with previous skins and should be aware of existing style guides and the ways in which they direr.
	Read and comprehend grade-level complex texts proticiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
	Name healthy options to health-related issues or problems.
HE.2.B.5.2:	Clarifications: Safety equipment, peer cooperation, and communication.
	Recognize the locations and functions of major human organs.
HE.2.C.1.5:	Clarifications: The functions of the heart, lungs, and muscles.

GENERAL NOTES

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

Asking questions (for science) and defining problems (for engineering).

- Developing and using models.
- Planning and carrying out investigations.

- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course	Number:	5020030
0001.50	i u di li li di	0020000

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades PreK to 5 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: SCIENCE GRADE TWO Course Length: Year (Y) Course Attributes: • Class Size Core Required

Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): 2

Educator Certifications

Elementary Education (Elementary Grades 1-6)	
Science (Elementary Grades 1-6)	
Primary Education (K-3)	
Prekindergarten/Primary Education (Age 3 through Grade 3)	
Elementary Education (Grades K-6)	

Science - Grade Three (#5020040) 2015 - 2022 (current)

Name	Description	
SC.3.E.5.1:	Explain that stars can be different; some are smaller, some are larger, and some appear brighter than others; all except the Sun are so far away that they look like points of light.	
SC.3.E.5.2:	Identify the Sun as a star that emits energy; some of it in the form of light.	
SC.3.E.5.3:	Recognize that the Sun appears large and bright because it is the closest star to Earth.	
SC.3.E.5.4:	Explore the Law of Gravity by demonstrating that gravity is a force that can be overcome.	
SC.3.E.5.5:	Investigate that the number of stars that can be seen through telescopes is dramatically greater than those seen by the unaided eye.	
SC.3.E.6.1:	Demonstrate that radiant energy from the Sun can heat objects and when the Sun is not present, heat may be lost.	
SC.3.L.14.1:	Describe structures in plants and their roles in food production, support, water and nutrient transport, and reproduction.	
SC.3.L.14.2:	Investigate and describe how plants respond to stimuli (heat, light, gravity), such as the way plant stems grow toward light and their roots grow downward in response to gravity.	
SC.3.L.15.1:	Classify animals into major groups (mammals, birds, reptiles, amphibians, fish, arthropods, vertebrates and invertebrates, those having live births and those which lay eggs) according to their physical characteristics and behaviors.	
SC.3.L.15.2:	Classify flowering and nonflowering plants into major groups such as those that produce seeds, or those like ferns and mosses that produce spores, according to their physical characteristics.	
SC.3.L.17.1:	Describe how animals and plants respond to changing seasons.	
SC.3.L.17.2:	Recognize that plants use energy from the Sun, air, and water to make their own food.	
SC.3.N.1.1:	Raise questions about the natural world, investigate them individually and in teams through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.	
SC.3.N.1.2:	Compare the observations made by different groups using the same tools and seek reasons to explain the differences across groups.	
SC.3.N.1.3:	Keep records as appropriate, such as pictorial, written, or simple charts and graphs, of investigations conducted.	
SC.3.N.1.4:	Recognize the importance of communication among scientists.	
SC.3.N.1.5:	Recognize that scientists question, discuss, and check each other's evidence and explanations.	
SC.3.N.1.6:	Infer based on observation.	
SC.3.N.1.7:	Explain that empirical evidence is information, such as observations or measurements, that is used to help validate explanations of natural phenomena.	
SC.3.N.3.1:	Recognize that words in science can have different or more specific meanings than their use in everyday language; for example, energy, cell, heat/cold, and evidence.	
SC.3.N.3.2:	Recognize that scientists use models to help understand and explain how things work.	
SC.3.N.3.3:	Recognize that all models are approximations of natural phenomena; as such, they do not perfectly account for all observations.	
SC.3.P.8.1:	Measure and compare temperatures of various samples of solids and liquids.	
SC.3.P.8.2:	Measure and compare the mass and volume of solids and liquids.	
SC.3.P.8.3:	Compare materials and objects according to properties such as size, shape, color, texture, and hardness.	
SC.3.P.9.1:	Describe the changes water undergoes when it changes state through heating and cooling by using familiar scientific terms such as melting, freezing, boiling, evaporation, and condensation.	
SC.3.P.10.1:	Identify some basic forms of energy such as light, heat, sound, electrical, and mechanical.	
SC.3.P.10.2:	Recognize that energy has the ability to cause motion or create change.	
SC.3.P.10.3:	Demonstrate that light travels in a straight line until it strikes an object or travels from one medium to another.	
SC.3.P.10.4:	Demonstrate that light can be reflected, refracted, and absorbed.	
SC.3.P.11.1:	Investigate, observe, and explain that things that give off light often also give off heat.	
SC.3.P.11.2:	Investigate, observe, and explain that heat is produced when one object rubs against another, such as rubbing one's hands together.	
	Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units.	
	Clarifications:	
MAFS.3.MD.1.2:	Examples of Opportunities for In-Depth Focus	
	Continuous measurement quantities such as liquid volume, mass, and so on are an important context for fraction arithmetic (cf. 4.NF.2.4c, 5.NF.2.7c, 5.NF.2.3). In grade 3, students begin to get a feel for continuous measurement quantities and solve whole- number problems involving such quantities.	
MAFS.3.MD.2.4:	Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.	
	Make sense of problems and persevere in solving them.	
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.	
1		

	Standard Relation to Course: Supporting
	Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
	Construct viable arguments and critique the reasoning of others.
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting Model with mathematics.
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y .
	Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	students might notice when dividing 25 by 11 that they are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting

LAFS.3.RI.1.3:	Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.
LAFS.3.RI.2.4:	Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 3 topic or subject area.
LAFS.3.RI.4.10:	By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, at the high end of the grades 2–3 text complexity band independently and proficiently.
LAFS.3.SL.1.1:	 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 <i>topics and texts</i>, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion. b. Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion). c. Ask questions to check understanding of information presented, stay on topic, and link their comments to the remarks of others. d. Explain their own ideas and understanding in light of the discussion.
LAFS.3.W.3.8:	Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
HE.3.C.1.4:	Recognize common childhood health conditions.
	Clarifications: Asthma, diabetes, food allergies, dental cavities, and colds.
HE.3.C.1.5:	Recognize that body parts and organs work together to form human body systems.
	Clarifications: Circulatory system, digestive system, nervous system, reproductive system, and other body systems.

GENERAL NOTES

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION	
Course Number: 5020040	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades PreK to 5 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: SCIENCE GRADE THREE Course Length: Year (Y)

Course Attributes:

Class Size Core Required

Educator Certifications

Elementary Education (Elementary Grades 1-6)

Primary Education (K-3)

Science (Elementary Grades 1-6)

Prekindergarten/Primary Education (Age 3 through Grade 3)

Elementary Education (Grades K-6)

Science - Grade Three (#5020040) 2022 - And Beyond

Name	Description
SC.3.E.5.1:	Explain that stars can be different; some are smaller, some are larger, and some appear brighter than others; all except the Sun are so far away that they look like points of light.
SC.3.E.5.2:	Identify the Sun as a star that emits energy; some of it in the form of light.
SC.3.E.5.3:	Recognize that the Sun appears large and bright because it is the closest star to Earth.
SC.3.E.5.4:	Explore the Law of Gravity by demonstrating that gravity is a force that can be overcome.
SC.3.E.5.5:	Investigate that the number of stars that can be seen through telescopes is dramatically greater than those seen by the unaided eye.
SC.3.E.6.1:	Demonstrate that radiant energy from the Sun can heat objects and when the Sun is not present, heat may be lost.
SC.3.L.14.1:	Describe structures in plants and their roles in food production, support, water and nutrient transport, and reproduction.
SC.3.L.14.2:	Investigate and describe how plants respond to stimuli (heat, light, gravity), such as the way plant stems grow toward light and their roots grow downward in response to gravity.
SC.3.L.15.1:	Classify animals into major groups (mammals, birds, reptiles, amphibians, fish, arthropods, vertebrates and invertebrates, those having live births and those which lay eggs) according to their physical characteristics and behaviors.
SC.3.L.15.2:	Classify flowering and nonflowering plants into major groups such as those that produce seeds, or those like ferns and mosses that produce spores, according to their physical characteristics.
SC.3.L.17.1:	Describe how animals and plants respond to changing seasons.
SC.3.L.17.2:	Recognize that plants use energy from the Sun, air, and water to make their own food.
SC.3.N.1.1:	Raise questions about the natural world, investigate them individually and in teams through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.
SC.3.N.1.2:	Compare the observations made by different groups using the same tools and seek reasons to explain the differences across groups.
SC.3.N.1.3:	Keep records as appropriate, such as pictorial, written, or simple charts and graphs, of investigations conducted.
SC.3.N.1.4:	Recognize the importance of communication among scientists.
SC.3.N.1.5:	Recognize that scientists question, discuss, and check each other's evidence and explanations.
SC.3.N.1.6:	Infer based on observation.
SC.3.N.1.7:	Explain that empirical evidence is information, such as observations or measurements, that is used to help validate explanations of natural phenomena.
SC.3.N.3.1:	Recognize that words in science can have different or more specific meanings than their use in everyday language; for example, energy, cell, heat/cold, and evidence.
SC.3.N.3.2:	Recognize that scientists use models to help understand and explain how things work.
SC.3.N.3.3:	Recognize that all models are approximations of natural phenomena; as such, they do not perfectly account for all observations.
SC.3.P.8.1:	Measure and compare temperatures of various samples of solids and liquids.
SC.3.P.8.2:	Measure and compare the mass and volume of solids and liquids.
SC.3.P.8.3:	Compare materials and objects according to properties such as size, shape, color, texture, and hardness.
SC.3.P.9.1:	Describe the changes water undergoes when it changes state through heating and cooling by using familiar scientific terms such as melting, freezing, boiling, evaporation, and condensation.
SC.3.P.10.1:	Identify some basic forms of energy such as light, heat, sound, electrical, and mechanical.
SC.3.P.10.2:	Recognize that energy has the ability to cause motion or create change.
SC.3.P.10.3:	Demonstrate that light travels in a straight line until it strikes an object or travels from one medium to another.
SC.3.P.10.4:	Demonstrate that light can be reflected, refracted, and absorbed.
SC.3.P.11.1:	Investigate, observe, and explain that things that give off light often also give off heat.
SC.3.P.11.2:	Investigate, observe, and explain that heat is produced when one object rubs against another, such as rubbing one's hands together.
	Mathematicians who participate in effortful learning both individually and with others:
	 Analyze the problem in a way that makes sense given the task.
	Ask questions that will help with solving the task.
	 Build perseverance by modifying methods as needed while solving a challenging task.
	Stay engaged and maintain a positive mindset when working to solve tasks.
	Help and support each other when attempting a new method or approach.
IVIA.N12.IVITR.1.1.	Clarifications:
	Teachers who encourage students to participate actively in effortful learning both individually and with others:
	Cultivate a community of growth mindset learners.
	Foster perseverance in students by choosing tasks that are challenging.
	Develop students' ability to analyze and problem solve.
	Recognize students' effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:
	Build understanding through modeling and using manipulatives.
	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
	 Progress from modeling problems with objects and drawings to using algorithms and equations.
	Express connections between concepts and representations.
MA.K12.MTR.2.1:	Choose a representation based on the given context or purpose.

	Clarifications:
	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:
	Help students make connections between concepts and representations.
	Provide opportunities for students to use manipulatives when investigating concepts.
	Guide students from concrete to pictorial to abstract representations as understanding progresses.
	Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency.
	Mathematicians who complete tasks with mathematical fluency:
	Select efficient and appropriate methods for solving problems within the given context.
	Maintain flexibility and accuracy while performing procedures and mental calculations.
	Complete tasks accurately and with confidence.
	Adapt procedures to apply them to a new context.
MA.K12.MTR.3.1:	Use feedback to improve efficiency when performing calculations.
	Clarifications:
	Teachers who encourage students to complete tasks with mathematical fluency:
	Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
	Offer multiple opportunities for students to practice efficient and generalizable methods.
	Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others.
	Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
	Communicate mathematical ideas, vocabulary and methods effectively
	Analyze the mathematical thinking of others.
	Compare the efficiency of a method to those expressed by others.
	Recognize errors and suggest how to correctly solve the task.
	Justify results by explaining methods and processes.
MA.K12.MTR.4.1:	Construct possible arguments based on evidence.
	Clarifications:
	Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:
	• Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.
	Create opportunities for students to discuss their thinking with peers.
	• Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.
	Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts.
	Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
	Focus on relevant details within a problem.
	Create plans and procedures to logically order events, steps or ideas to solve problems.
	Decompose a complex problem into manageable parts.
	Relate previously learned concepts to new concepts.
	Look for similarities among problems.
IVIA.K Z.IVI R.S. I :	Connect solutions of problems to more complicated large-scale situations.
	Clarifications:
	Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:
	Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
	Support students to develop generalizations based on the similarities found among problems.
	 Provide opportunities for students to create plans and procedures to solve problems.
	Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions.
	Mathematicians who assess the reasonableness of solutions:
	Estimate to discover possible colutions
	• Estimate to discover possible solutions.
	 Use benchmark quantities to determine if a solution makes sense.
	 Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems.
	 Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used.
MA.K12.MTR.6.1:	 Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions:
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving.
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?"
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task.
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts.
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts:
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences.
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems.

MA K12 MTR 7 1	efficiency.
WIA.N 12.WITN.7.1.	Clarifications:
	Teachers who encourage students to apply mathematics to real-world contexts:
	Provide opportunities for students to create models, both concrete and abstract, and perform investigations.
	Challenge students to question the accuracy of their models and methods.
	 Support students as they validate conclusions by comparing them to the given situation.
	Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	Clarifications:
	K-1 students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.
	2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In
	3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly
	quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide
	referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications:
	See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
	Clarifications:
ELA.K12.EE.3.1:	Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the
	beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
	Clarifications:
	In kindergarten, students learn to listen to one another respectfully.
FLA.K12.FF.4.1:	In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The
	collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills.
	Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
	Clarifications:
ELA.K12.EE.5.1:	Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they
	must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to
	Lise appropriate voice and tane when speaking or writing
ELA.K12.EE.6.1:	In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends
	differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
HE.3.C.1.4:	Recognize common childhood health conditions.
	Clarifications:
	Astrinia, urapetes, rood allergies, dental cavities, and colds.
	Recognize that body parts and organs work together to form numan body systems.
HE.3.C.1.5:	Circulatory system, digestive system, nervous system, reproductive system, and other hody systems
	en salate, j sjoren, algoare sjoren, në roas sjoren, reproduktive sjoren, and other body sjorens.

GENERAL NOTES

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

1. Ensuring wide reading from complex text that varies in length.

2. Making close reading and rereading of texts central to lessons.

3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.

- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 5020040

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades PreK to 5 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: SCIENCE GRADE THREE Course Length: Year (Y) Course Attributes: • Class Size Core Required

Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): 3

Educator Certifications

Elementary Education (Elementary Grades 1-6) Primary Education (K-3) Science (Elementary Grades 1-6) Prekindergarten/Primary Education (Age 3 through Grade 3) Elementary Education (Grades K-6)

Science - Grade Four (#5020050) 2015 - 2022 (current)

Name	Description
SC.4.E.5.1:	Observe that the patterns of stars in the sky stay the same although they appear to shift across the sky nightly, and different stars can be seen in different seasons.
SC.4.E.5.2:	Describe the changes in the observable shape of the moon over the course of about a month.
SC.4.E.5.3:	Recognize that Earth revolves around the Sun in a year and rotates on its axis in a 24-hour day.
SC.4.E.5.4:	Relate that the rotation of Earth (day and night) and apparent movements of the Sun, Moon, and stars are connected.
SC.4.E.5.5:	Investigate and report the effects of space research and exploration on the economy and culture of Florida.
SC.4.E.6.1:	Identify the three categories of rocks: igneous, (formed from molten rock); sedimentary (pieces of other rocks and fossilized organisms); and metamorphic (formed from heat and pressure).
SC.4.E.6.2:	Identify the physical properties of common earth-forming minerals, including hardness, color, luster, cleavage, and streak color, and recognize the role of minerals in the formation of rocks.
SC.4.E.6.3:	Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable.
SC.4.E.6.4:	Describe the basic differences between physical weathering (breaking down of rock by wind, water, ice, temperature change, and plants) and erosion (movement of rock by gravity, wind, water, and ice).
SC.4.E.6.5:	Investigate how technology and tools help to extend the ability of humans to observe very small things and very large things.
SC.4.E.6.6:	Identify resources available in Florida (water, phosphate, oil, limestone, silicon, wind, and solar energy).
SC.4.L.16.1:	Identify processes of sexual reproduction in flowering plants, including pollination, fertilization (seed production), seed dispersal, and germination.
SC.4.L.16.2:	Explain that although characteristics of plants and animals are inherited, some characteristics can be affected by the environment.
SC.4.L.16.3:	Recognize that animal behaviors may be shaped by heredity and learning.
SC.4.L.16.4:	Compare and contrast the major stages in the life cycles of Florida plants and animals, such as those that undergo incomplete and complete metamorphosis, and flowering and nonflowering seed-bearing plants.
SC.4.L.17.1:	Compare the seasonal changes in Florida plants and animals to those in other regions of the country.
SC.4.L.17.2:	Explain that animals, including humans, cannot make their own food and that when animals eat plants or other animals, the energy stored in the food source is passed to them.
SC.4.L.17.3:	Trace the flow of energy from the Sun as it is transferred along the food chain through the producers to the consumers.
SC.4.L.17.4:	Recognize ways plants and animals, including humans, can impact the environment.
SC.4.N.1.1:	Raise questions about the natural world, use appropriate reference materials that support understanding to obtain information (identifying the source), conduct both individual and team investigations through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.
SC.4.N.1.2:	Compare the observations made by different groups using multiple tools and seek reasons to explain the differences across groups.
SC.4.N.1.3:	Explain that science does not always follow a rigidly defined method ("the scientific method") but that science does involve the use of observations and empirical evidence.
SC.4.N.1.4:	Attempt reasonable answers to scientific questions and cite evidence in support.
SC.4.N.1.5:	Compare the methods and results of investigations done by other classmates.
SC.4.N.1.6:	Keep records that describe observations made, carefully distinguishing actual observations from ideas and inferences about the observations.
SC.4.N.1.7:	Recognize and explain that scientists base their explanations on evidence.
SC.4.N.1.8:	Recognize that science involves creativity in designing experiments.
SC.4.N.2.1:	Explain that science focuses solely on the natural world.
SC.4.N.3.1:	Explain that models can be three dimensional, two dimensional, an explanation in your mind, or a computer model.
SC.4.P.8.1:	Measure and compare objects and materials based on their physical properties including: mass, shape, volume, color, hardness, texture, odor, taste, attraction to magnets.
SC.4.P.8.2:	Identify properties and common uses of water in each of its states.
SC.4.P.8.3:	Explore the Law of Conservation of Mass by demonstrating that the mass of a whole object is always the same as the sum of the masses of its parts.
SC.4.P.8.4:	Investigate and describe that magnets can attract magnetic materials and attract and repel other magnets.
SC.4.P.9.1:	Identify some familiar changes in materials that result in other materials with different characteristics, such as decaying animal or plant matter, burning, rusting, and cooking.
SC.4.P.10.1:	Observe and describe some basic forms of energy, including light, heat, sound, electrical, and the energy of motion.
SC.4.P.10.2:	Investigate and describe that energy has the ability to cause motion or create change.
SC.4.P.10.3:	Investigate and explain that sound is produced by vibrating objects and that pitch depends on how fast or slow the object vibrates.
SC.4.P.10.4:	Describe how moving water and air are sources of energy and can be used to move things.
SC.4.P.11.1:	Recognize that heat flows from a hot object to a cold object and that heat flow may cause materials to change temperature.
SC.4.P.11.2:	Identify common materials that conduct heat well or poorly.
SC.4.P.12.1: SC.4.P.12.2:	Recognize that an object in motion always changes its position and may change its direction. Investigate and describe that the speed of an object is determined by the distance it travels in a unit of time and that objects can move at different
MAFS.4.MD.1.1:	speeds. Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36),
MAFS.4.MD.2.4:	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.

	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting
MAFS.K12.MP.2.1:	Reason abstractly and quantitatively. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
MAFS.K12.MP.6.1:	Attend to precision. Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions. Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.

	Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results. Standard Relation to Course: Supporting
LAFS.4.RI.1.3:	Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.
LAFS.4.RI.2.4:	Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.
LAFS.4.RI.4.10:	By the end of year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 4–5 text complexity band proficiently, with scaffolding as needed at the high end of the range.
LAFS.4.SL.1.1:	 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion. b. Follow agreed-upon rules for discussions and carry out assigned roles. c. Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others. d. Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.
LAFS.4.W.3.8:	Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.
LAFS.4.W.3.9:	 Draw evidence from literary or informational texts to support analysis, reflection, and research. a. Apply grade 4 Reading standards to literature (e.g., "Describe in depth a character, setting, or event in a story or drama, drawing on specific details in the text [e.g., a character's thoughts, words, or actions]."). b. Apply grade 4 Reading standards to informational texts (e.g., "Explain how an author uses reasons and evidence to support particular points in a text").
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
	Identify the human body parts and organs that work together to form healthy body systems.
HE.4.C.1.5:	Clarifications: Muscular and skeletal systems, circulatory and respiratory systems, and endocrine and reproductive systems.

GENERAL NOTES

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- $\label{eq:constraint} \textbf{4.} \ \ \textbf{Emphasizing students supporting answers based upon evidence from the text}.$
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Additional content addressed on the Grade 4 NAEP Science assessment includes:

- Earth materials have properties that make them useful in solving human problems and enhancing the quality of life. (SC.6.E.6.2)
- The Sun warms the land, air, and water and helps plants grow. (SC.3.E.6.1;SC.3.L.17.2)
- Weather changes from day to day and during the seasons. (SC.2.E.7.1)
- Scientists use tools for observing, recording, and predicting weather changes. (SC.5.E.7.3; SC.5.E.7.4)

- Plants and animals have life cycles. (SC.2.L.16.1)
- Environment changes impact organism survival and reproduction. (SC.5.L.15.1)
- Organisms need food, water, air, and shelter. (SC.1.L.17.1)
- Some objects are composed of a single substance; others are composed of more than one substance. (SC.5.P.8.3)
- Heat (thermal energy) results when substances burn, materials rub against each other, and electricity flows though wires. (SC.3.P.11.2)
- Metals are conductors of heat and electricity. (SC.3.P.11.2)
- Increasing the temperature of any substance requires the addition of energy.
- Electricity flowing through an electrical circuit produces magnetic effects in the wires. Energy is transferred to the surroundings as light, sound, and heat (thermal energy). (SC.5.P.11.1; SC.5.P.11.2)

The NAEP frameworks for Science may be accessed at http://www.nagb.org/publications/frameworks/science-09.pdf

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 5020050

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades PreK to 5 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: SCIENCE GRADE FOUR Course Length: Year (Y) Course Attributes: • Class Size Core Required

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 4

Educator Certifications

Elementary Education (Elementary Grades 1-6)
Science (Elementary Grades 1-6)
Elementary Education (Grades K-6)

Science - Grade Four (#5020050) 2022 - And Beyond

Name	Description
SC.4.E.5.1:	Observe that the patterns of stars in the sky stay the same although they appear to shift across the sky nightly, and different stars can be seen in different seasons.
SC.4.E.5.2:	Describe the changes in the observable shape of the moon over the course of about a month.
SC.4.E.5.3:	Recognize that Earth revolves around the Sun in a year and rotates on its axis in a 24-hour day.
SC.4.E.5.4:	Relate that the rotation of Earth (day and night) and apparent movements of the Sun, Moon, and stars are connected.
SC.4.E.5.5:	Investigate and report the effects of space research and exploration on the economy and culture of Florida.
SC.4.E.6.1:	Identify the three categories of rocks: igneous, (formed from molten rock); sedimentary (pieces of other rocks and fossilized organisms); and metamorphic (formed from heat and pressure).
SC.4.E.6.2:	Identify the physical properties of common earth-forming minerals, including hardness, color, luster, cleavage, and streak color, and recognize the role of minerals in the formation of rocks.
SC.4.E.6.3:	Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable.
SC.4.E.6.4:	Describe the basic differences between physical weathering (breaking down of rock by wind, water, ice, temperature change, and plants) and erosion (movement of rock by gravity, wind, water, and ice).
SC.4.E.6.5:	Investigate how technology and tools help to extend the ability of humans to observe very small things and very large things.
SC.4.E.6.6:	Identify resources available in Florida (water, phosphate, oil, limestone, silicon, wind, and solar energy).
SC.4.L.16.1:	Identify processes of sexual reproduction in flowering plants, including pollination, fertilization (seed production), seed dispersal, and germination.
SC.4.L.16.2:	Explain that although characteristics of plants and animals are inherited, some characteristics can be affected by the environment.
SC.4.L.16.3:	Recognize that animal behaviors may be shaped by heredity and learning.
SC 4 L 16 4 [.]	Compare and contrast the major stages in the life cycles of Florida plants and animals, such as those that undergo incomplete and complete
oor nier for n	metamorphosis, and flowering and nonflowering seed-bearing plants.
SC.4.L.17.1:	Compare the seasonal changes in Florida plants and animals to those in other regions of the country.
SC.4.L.17.2:	Explain that animals, including humans, cannot make their own food and that when animals eat plants or other animals, the energy stored in the food source is passed to them.
SC.4.L.17.3:	Trace the flow of energy from the Sun as it is transferred along the food chain through the producers to the consumers.
SC.4.L.17.4:	Recognize ways plants and animals, including humans, can impact the environment.
SC.4.N.1.1:	Raise questions about the natural world, use appropriate reference materials that support understanding to obtain information (identifying the source), conduct both individual and team investigations through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.
SC.4.N.1.2:	Compare the observations made by different groups using multiple tools and seek reasons to explain the differences across groups.
SC.4.N.1.3:	Explain that science does not always follow a rigidly defined method ("the scientific method") but that science does involve the use of observations and empirical evidence.
SC.4.N.1.4:	Attempt reasonable answers to scientific questions and cite evidence in support.
SC.4.N.1.5:	Compare the methods and results of investigations done by other classmates.
SC.4.N.1.6:	Keep records that describe observations made, carefully distinguishing actual observations from ideas and inferences about the observations.
SC.4.N.1.7:	Recognize and explain that scientists base their explanations on evidence.
SC.4.N.1.8:	Recognize that science involves creativity in designing experiments.
SC.4.N.2.1:	Explain that science focuses solely on the natural world.
SC.4.N.3.1:	Explain that models can be three dimensional, two dimensional, an explanation in your mind, or a computer model.
SC.4.P.8.1:	Measure and compare objects and materials based on their physical properties including: mass, shape, volume, color, hardness, texture, odor, taste, attraction to magnets.
SC.4.P.8.2:	Identify properties and common uses of water in each of its states.
SC.4.P.8.3:	Explore the Law of Conservation of Mass by demonstrating that the mass of a whole object is always the same as the sum of the masses of its parts.
SC.4.P.8.4:	Investigate and describe that magnets can attract magnetic materials and attract and repel other magnets.
SC.4.P.9.1:	Identify some familiar changes in materials that result in other materials with different characteristics, such as decaying animal or plant matter, burning, rusting, and cooking.
SC.4.P.10.1:	Observe and describe some basic forms of energy, including light, heat, sound, electrical, and the energy of motion.
SC.4.P.10.2:	Investigate and describe that energy has the ability to cause motion or create change.
SC.4.P.10.3:	Investigate and explain that sound is produced by vibrating objects and that pitch depends on how fast or slow the object vibrates.
SC.4.P.10.4:	Describe how moving water and air are sources of energy and can be used to move things.
SC.4.P.11.1:	Recognize that heat flows from a hot object to a cold object and that heat flow may cause materials to change temperature.
SC.4.P.11.2:	Identify common materials that conduct heat well or poorly.
SC.4.P.12.1:	Recognize that an object in motion always changes its position and may change its direction.
SC.4.P.12.2:	Investigate and describe that the speed of an object is determined by the distance it travels in a unit of time and that objects can move at different speeds.
	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will belo with solving the task
	Build perseverance by modifying methods as needed while solving a challenging task
	 Stay engaged and maintain a positive mindset when working to solve tasks. Using a stage stage
MA.K12.MTR 1 1	 Heip and support each other when attempting a new method or approach.
and the second s	Clarifications:
	 Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems.
---------------------	--
MA K12 MTR 2 1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose.
MA.K I 2.MI K.2, I:	Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	 Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations.
	 Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence.
	Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations.
	 Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	 Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used.
MA.K12.MTR.6.1:	Evaluate results based on the given context.

	Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
	 Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.2.1: ELA.K12.EE.3.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.2.1: ELA.K12.EE.3.1: ELA.K12.EE.4.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.2.1: ELA.K12.EE.3.1: ELA.K12.EE.4.1: ELA.K12.EE.5.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence. Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.2.1: ELA.K12.EE.3.1: ELA.K12.EE.4.1: ELA.K12.EE.5.1: ELA.K12.EE.6.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students being academic conversations. In grades 3-12, students engage in academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence. Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work. Clarifications: Students will incorporate skills learned
ELA.K12.EE.2.1: ELA.K12.EE.3.1: ELA.K12.EE.4.1: ELA.K12.EE.5.1: ELA.K12.EE.6.1: ELD.K12.ELL.SC.1: ELD.K12.ELL.SC.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversation discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation and support claims and counterclaims with evidence. Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work. Use appropriate voice and tone when sp

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Additional content addressed on the Grade 4 NAEP Science assessment includes:

- Earth materials have properties that make them useful in solving human problems and enhancing the quality of life. (SC.6.E.6.2)
- The Sun warms the land, air, and water and helps plants grow. (SC.3.E.6.1;SC.3.L.17.2)
- Weather changes from day to day and during the seasons. (SC.2.E.7.1)
- Scientists use tools for observing, recording, and predicting weather changes. (SC.5.E.7.3; SC.5.E.7.4)
- Plants and animals have life cycles. (SC.2.L.16.1)
- Environment changes impact organism survival and reproduction. (SC.5.L.15.1)
- Organisms need food, water, air, and shelter. (SC.1.L.17.1)
- Some objects are composed of a single substance; others are composed of more than one substance. (SC.5.P.8.3)
- Heat (thermal energy) results when substances burn, materials rub against each other, and electricity flows though wires. (SC.3.P.11.2)
- Metals are conductors of heat and electricity. (SC.3.P.11.2)
- Increasing the temperature of any substance requires the addition of energy.
- Electricity flowing through an electrical circuit produces magnetic effects in the wires. Energy is transferred to the surroundings as light, sound, and heat (thermal energy). (SC.5.P.11.1; SC.5.P.11.2)

The NAEP frameworks for Science may be accessed at http://www.nagb.org/publications/frameworks/science-09.pdf

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 5020050

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades PreK to 5 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: SCIENCE GRADE FOUR Course Length: Year (Y) Course Attributes: • Class Size Core Required

Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): 4

Educator Certifications

Elementary Education (Elementary Grades 1-6)

page 40 of 926

Science (Elementary Grades 1-6) Elementary Education (Grades K-6)

Science - Grade Five (#5020060) 2015 - 2022 (current)

Name	Description
SC.5.E.5.1:	Recognize that a galaxy consists of gas, dust, and many stars, including any objects orbiting the stars. Identify our home galaxy as the Milky Way.
SC.5.E.5.2:	Recognize the major common characteristics of all planets and compare/contrast the properties of inner and outer planets.
SC.5.E.5.3:	Distinguish among the following objects of the Solar System Sun, planets, moons, asteroids, comets and identify Earth's position in it.
SC.5.E.7.1:	Create a model to explain the parts of the water cycle. Water can be a gas, a liquid, or a solid and can go back and forth from one state to another. Recognize that the ocean is an integral part of the water cycle and is connected to all of Earth's water reservoirs via evaporation and precipitation
SC.5.E.7.2:	processes.
SC.5.E.7.3:	Recognize how air temperature, barometric pressure, humidity, wind speed and direction, and precipitation determine the weather in a particular place and time.
SC.5.E.7.4:	Distinguish among the various forms of precipitation (rain, snow, sleet, and hail), making connections to the weather in a particular place and time.
SC.5.E.7.5:	Recognize that some of the weather-related differences, such as temperature and humidity, are found among different environments, such as swamps, deserts, and mountains.
SC.5.E.7.6:	Describe characteristics (temperature and precipitation) of different climate zones as they relate to latitude, elevation, and proximity to bodies of water.
SC.5.E.7.7:	Design a family preparedness plan for natural disasters and identify the reasons for having such a plan.
SC.5.L.14.1:	Identify the organs in the human body and describe their functions, including the skin, brain, heart, lungs, stomach, liver, intestines, pancreas, muscles and skeleton, reproductive organs, kidneys, bladder, and sensory organs.
SC.5.L.14.2:	Compare and contrast the function of organs and other physical structures of plants and animals, including humans, for example: some animals have schedung for support
SC.5.L.15.1:	Describe how, when the environment changes, differences between individuals allow some plants and animals to survive and reproduce while others
	die or move to new locations.
SC.5.L.17.1:	Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments such as life cycles variations, animal behaviors and physical characteristics.
SC.5.N.1.1:	Define a problem, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types such as: systematic observations, experiments requiring the identification of variables, collecting and organizing data, interpreting data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.5.N.1.2:	Explain the difference between an experiment and other types of scientific investigation.
SC.5.N.1.3:	Recognize and explain the need for repeated experimental trials.
SC.5.N.1.4:	Identify a control group and explain its importance in an experiment.
SC.5.N.1.5:	Recognize and explain that authentic scientific investigation frequently does not parallel the steps of "the scientific method."
SC.5.N.1.6:	Recognize and explain the difference between personal opinion/interpretation and verified observation.
SC.5.N.2.1:	Recognize and explain that science is grounded in empirical observations that are testable; explanation must always be linked with evidence.
SC.5.N.2.2:	Recognize and explain that when scientific investigations are carried out, the evidence produced by those investigations should be replicable by others.
SC.5.P.8.1:	Compare and contrast the basic properties of solids, liquids, and gases, such as mass, volume, color, texture, and temperature.
SC.5.P.8.2:	Investigate and identify materials that will dissolve in water and those that will not and identify the conditions that will speed up or slow down the dissolving process.
SC.5.P.8.3:	Demonstrate and explain that mixtures of solids can be separated based on observable properties of their parts such as particle size, shape, color, and magnetic attraction.
SC.5.P.8.4:	Explore the scientific theory of atoms (also called atomic theory) by recognizing that all matter is composed of parts that are too small to be seen without magnification
SC 5 P 9 1	Investigate and describe that many physical and chemical changes are affected by temperature
SC 5 P 10 1	Investigate and describe some basic forms of energy including light heat sound electrical chemical and mechanical
SC 5 P 10 2	Investigate and describe some basic forms of energy, including light, next, sound, electrical, energical, and mechanical.
SC.5.P.10.3:	Investigate and explain that an electrically-charged object can attract an uncharged object and can either attract or repel another charged object without any context between the object.
SC 5 P 10 4	Investigate and explain that electrical energy can be transformed into heat light, and sound energy as well as the energy of motion
SC 5 P 11 1	Investigate and explain that electrical energy can be transformed into heat, light, and sound energy, as well as the energy of motion.
SC 5 P 11 2	Identify and classify materials that conduct electricity and materials that do not
SC 5 P 13 1	Identify familiar forces that cause objects to move such as pushes or pulls including gravity acting on falling objects
SC 5 P 13 2	Investigate and describe that the greater the force applied to it, the greater the change in motion of a given object.
SC 5 P 13 3	Investigate and describe that the more mass an object has the less effect a given force will have on the object's motion
00.0.1 . 10.0.	Investigate and explain that when a force is applied to an object but it does not move, it is because another opposing force is being applied by
SC.5.P.13.4:	something in the environment so that the forces are balanced.
MAFS.5.G.1.1:	coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).
MAFS.5.MD.2.2:	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.
	Make sense of problems and persevere in solving them.

MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting Model with mathematics.
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y. Standard Relation to Course: Supporting
	······································

	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.5.RI.1.3:	Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
LAFS.5.RI.2.4:	Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.
LAFS.5.RI.4.10:	By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, at the high end of the grades 4–5 text complexity band independently and proficiently.
LAFS.5.SL.1.1:	 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion. b. Follow agreed-upon rules for discussions and carry out assigned roles. c. Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others. d. Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.
LAFS.5.W.3.8:	Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.
LAFS.5.W.3.9:	 Draw evidence from literary or informational texts to support analysis, reflection, and research. a. Apply grade 5 Reading standards to literature (e.g., "Compare and contrast two or more characters, settings, or events in a story or a drama, drawing on specific details in the text [e.g., how characters interact]"). b. Apply grade 5 Reading standards to informational texts (e.g., "Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point[s]").
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
HE.5.C.1.5:	Explain how human body parts and organs work together in healthy body systems, including the endocrine and reproductive systems. Clarifications: Digestive and circulatory systems receiving and distributing nutrients to provide energy, endocrine glands influencing the reproductive system and respiratory system providing oxygen to other body systems.

GENERAL NOTES

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

• Asking questions (for science) and defining problems (for engineering).

- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 5020060

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades PreK to 5 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: SCIENCE GRADE FIVE

Course Length: Year (Y) Course Attributes:

Class Size Core Required

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 5

Educator Certifications

Elementary Education (Elementary Grades 1-6) Middle Grades General Science (Middle Grades 5-9) Science (Elementary Grades 1-6) Elementary Education (Grades K-6)

Science - Grade Five (#5020060) 2022 - And Beyond

Name	Description
SC.5.E.5.1:	Recognize that a galaxy consists of gas, dust, and many stars, including any objects orbiting the stars. Identify our home galaxy as the Milky Way.
SC.5.E.5.2:	Recognize the major common characteristics of all planets and compare/contrast the properties of inner and outer planets.
SC.5.E.5.3:	Distinguish among the following objects of the Solar System Sun, planets, moons, asteroids, comets and identify Earth's position in it.
SC.5.E.7.1:	Create a model to explain the parts of the water cycle. Water can be a gas, a liquid, or a solid and can go back and forth from one state to another.
SC.5.E.7.2:	Recognize that the ocean is an integral part of the water cycle and is connected to all of Earth's water reservoirs via evaporation and precipitation processes.
SC.5.E.7.3:	Recognize how air temperature, barometric pressure, humidity, wind speed and direction, and precipitation determine the weather in a particular place and time.
SC.5.E.7.4:	Distinguish among the various forms of precipitation (rain, snow, sleet, and hail), making connections to the weather in a particular place and time.
SC.5.E.7.5:	Recognize that some of the weather-related differences, such as temperature and humidity, are found among different environments, such as swamps, deserts, and mountains.
SC.5.E.7.6:	Describe characteristics (temperature and precipitation) of different climate zones as they relate to latitude, elevation, and proximity to bodies of water.
SC.5.E.7.7:	Design a family preparedness plan for natural disasters and identify the reasons for having such a plan.
	Identify the organs in the human body and describe their functions, including the skin, brain, heart, lungs, stomach, liver, intestines, pancreas,
SC.5.L.14.1:	muscles and skeleton, reproductive organs, kidneys, bladder, and sensory organs.
SC.5.L.14.2:	skeletons for support some with internal skeletons others with exoskeletons while some plants have stems for support.
SC.5.L.15.1:	Describe how, when the environment changes, differences between individuals allow some plants and animals to survive and reproduce while others die or move to new locations.
SC.5.L.17.1:	Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments such as life cycles variations, animal behaviors and physical characteristics.
SC.5.N.1.1:	Define a problem, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types such as: systematic observations, experiments requiring the identification of variables, collecting and organizing data, interpreting data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.5.N.1.2:	Explain the difference between an experiment and other types of scientific investigation.
SC.5.N.1.3:	Recognize and explain the need for repeated experimental trials.
SC.5.N.1.4:	Identify a control group and explain its importance in an experiment.
SC.5.N.1.5:	Recognize and explain that authentic scientific investigation frequently does not parallel the steps of "the scientific method."
SC.5.N.1.6:	Recognize and explain the difference between personal opinion/interpretation and verified observation.
SC.5.N.2.1:	Recognize and explain that science is grounded in empirical observations that are testable; explanation must always be linked with evidence.
SC.5.N.2.2:	Recognize and explain that when scientific investigations are carried out, the evidence produced by those investigations should be replicable by others.
SC.5.P.8.1:	Compare and contrast the basic properties of solids, liquids, and gases, such as mass, volume, color, texture, and temperature.
SC.5.P.8.2:	Investigate and identify materials that will dissolve in water and those that will not and identify the conditions that will speed up or slow down the dissolving process.
SC.5.P.8.3:	Demonstrate and explain that mixtures of solids can be separated based on observable properties of their parts such as particle size, shape, color, and magnetic attraction.
SC.5.P.8.4:	Explore the scientific theory of atoms (also called atomic theory) by recognizing that all matter is composed of parts that are too small to be seen without magnification.
SC.5.P.9.1:	Investigate and describe that many physical and chemical changes are affected by temperature.
SC.5.P.10.1:	Investigate and describe some basic forms of energy, including light, heat, sound, electrical, chemical, and mechanical.
SC.5.P.10.2:	Investigate and explain that energy has the ability to cause motion or create change.
SC.5.P.10.3:	Investigate and explain that an electrically-charged object can attract an uncharged object and can either attract or repel another charged object without any contact between the objects.
SC.5.P.10.4:	Investigate and explain that electrical energy can be transformed into heat, light, and sound energy, as well as the energy of motion.
SC.5.P.11.1:	Investigate and illustrate the fact that the flow of electricity requires a closed circuit (a complete loop).
SC.5.P.11.2:	Identify and classify materials that conduct electricity and materials that do not.
SC.5.P.13.1:	Identify familiar forces that cause objects to move, such as pushes or pulls, including gravity acting on falling objects.
SC.5.P.13.2:	Investigate and describe that the greater the force applied to it, the greater the change in motion of a given object.
SC.5.P.13.3:	Investigate and describe that the more mass an object has, the less effect a given force will have on the object's motion.
SC.5.P.13.4:	Investigate and explain that when a force is applied to an object but it does not move, it is because another opposing force is being applied by something in the environment so that the forces are balanced.
	Mathematicians who participate in effortful learning both individually and with others:
	Analyze the problem in a way that makes sense given the task.
	Ask questions that will help with solving the task.
	Build perseverance by modifying methods as needed while solving a challenging task.
	Stay engaged and maintain a positive mindset when working to solve tasks.
	Help and support each other when attempting a new method or approach.
IVIA.N 12.IVI (K. I. I.	Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others:

	 Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose.
	Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications:

	 Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts:
MA.K12.MTR.7.1:	 Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
	Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Chalants build an idease approach the perspective and demonstrations are becoming academic conversations.
	students build on ideas, proper the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they
	must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting. Explain how human body parts and organs work together in healthy body systems, including the endocrine and reproductive systems.
HE.5.C.1.5:	Clarifications: Digestive and circulatory systems receiving and distributing nutrients to provide energy, endocrine glands influencing the reproductive system and respiratory system providing oxygen to other body systems.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 5020060

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades PreK to 5 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: SCIENCE GRADE FIVE Course Length: Year (Y) Course Attributes: • Class Size Core Required

Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): 5

Educator Certifications

Elementary Education (Elementary Grades 1-6)
Middle Grades General Science (Middle Grades 5-9)
Science (Elementary Grades 1-6)
Elementary Education (Grades K-6)

STEM Lab Kindergarten (#5020070) 2016 - 2022 (current)

Course Standards

Name	Description
SC.K.E.5.1:	Explore the Law of Gravity by investigating how objects are pulled toward the ground unless something holds them up.
SC.K.E.5.2:	Recognize the repeating pattern of day and night.
SC.K.E.5.3:	Recognize that the Sun can only be seen in the daytime.
SC.K.E.5.4:	Observe that sometimes the Moon can be seen at night and sometimes during the day.
SC.K.E.5.5:	Observe that things can be big and things can be small as seen from Earth.
SC.K.E.5.6:	Observe that some objects are far away and some are nearby as seen from Earth.
SC.K.N.1.1:	Collaborate with a partner to collect information.
SC.K.N.1.2:	Make observations of the natural world and know that they are descriptors collected using the five senses.
SC.K.N.1.3:	Keep records as appropriate such as pictorial records of investigations conducted.
SC.K.N.1.4:	Observe and create a visual representation of an object which includes its major features.
SC.K.N.1.5:	Recognize that learning can come from careful observation.
SC.K.P.8.1:	Sort objects by observable properties, such as size, shape, color, temperature (hot or cold), weight (heavy or light) and texture.
SC.K.P.9.1:	Recognize that the shape of materials such as paper and clay can be changed by cutting, tearing, crumpling, smashing, or rolling.
SC.K.P.10.1:	Observe that things that make sound vibrate.
SC.K.P.12.1:	Investigate that things move in different ways, such as fast, slow, etc.
SC.K.P.13.1:	Observe that a push or a pull can change the way an object is moving.
SC.K2.CS-CC.1.3:	Collaborate and cooperate with peers, teachers, and others using technology to solve problems.
SC.K2.CS-CP.1.1:	Identify different kinds of data (e.g., text, charts, graphs, numbers, pictures, audio, video, and collections of objects).
SC.K2.CS-CP.2.2:	Perform a simple task (e.g., making a sandwich and brushing teeth) breaking it into small steps.
SC.K2.CS-CP.3.1:	Create developmentally appropriate multimedia products with support from teachers, family members, or student partners.
SC.K2.CS-CS.2.2:	Solve age-appropriate problems (e.g., puzzles and logical thinking programs) with or without technology (i.e., computational thinking).
SC.K2.CS-CS.2.5:	Create a simple algorithm, individually and collaboratively, without using computers to complete the task (e.g., making a sandwich, getting ready for school).
SC.K2.CS-CS.3.1:	Create a digital artifact (independently and collaboratively) that clearly expresses thoughts and ideas.
SC.K2.CS-CS.4.1:	Recognize different kinds of computing devices in the classroom and other places (e.g., laptops, tablets, smart phones, desktops, printers).
SC.K2.CS-PC.2.2:	Communicate about technology using developmentally appropriate terminology.
MAFS.K.CC.1.1:	Count to 100 by ones and by tens.
MAFS.K.CC.1.2:	Count forward beginning from a given number within the known sequence (instead of having to begin at 1).
MAFS.K.CC.1.3:	Read and write numerals from 0 to 20. Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects).
	Understand the relationship between numbers and quantities; connect counting to cardinality.
	a. When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number
	name with one and only one object.
MAFS.K.CC.2.4:	b. Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their
	arrangement or the order in which they were counted.
	c. Understand that each successive number name refers to a quantity that is one larger.
	Count to answer they man of questions shout as many as 20 things arranged in a line, a restangular array or a sirale, or as many as 10 things in a
MAFS.K.CC.2.5:	scattered configuration; given a number from 1–20, count out that many objects.
MAFS.K.G.1.1:	Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as <i>above, below,</i> beside, in front of, behind, and next to.
MAFS.K.G.1.2:	Correctly name shapes regardless of their orientations or overall size.
MAFS.K.G.1.3:	Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").
MAFS.K.G.2.4:	Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).
MAFS.K.G.2.5:	Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.
MAFS.K.G.2.6:	Compose simple shapes to form larger shapes. For example, "Can you join these two triangles with full sides touching to make a rectangle?"
MAFS.K.MD.1.1:	Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.
MAFS.K.MD.1.2:	Directly compare two objects with a measurable attribute in common, to see which object has "more of'/"less of' the attribute, and describe the difference. For example, directly compare the heights of two children and describe one child as taller/shorter.
	Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end;
MAFS.K.MD.1.a:	understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. Limit to contexts
	where the object being measured is spanned by a whole number of length units with no gaps or overlaps.
MAFS.K.MD.2.3:	Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.

General Course Information and Notes

VERSION DESCRIPTION

Special Notes:

This course offers students an opportunity to deepen science, mathematics, engineering, and technology skills. The primary content focus will be to expand knowledge of current grade level standards in mathematics and science by applying that content in a real world, hands-on situation involving engineering and technology. For kindergarten, themes will focus on the investigation of number sense, measurement, geometry, earth science, and physical science concepts.

Students will participate in various hands-on STEM activities in this supplemental course to assist in the mastery of current grade level mathematics and science standards.

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information

English Language Development (ELD) Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English Language Learners (ELL) to communicate information, ideas and concepts for academic success in science and math. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

GENERAL INFORMATION

Course Number: 5020070

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades PreK to 5 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: STEM LAB K Course Length: Year (Y) Course Attributes: • Class Size Core Required

Course Status: Course Approved

Educator Certifications

Elementary Education (Grades K-6) Prekindergarten/Primary Education (Age 3 through Grade 3)

STEM Lab Kindergarten (#5020070) 2022 - And Beyond

Name	Description
SC.K.E.5.1:	Explore the Law of Gravity by investigating how objects are pulled toward the ground unless something holds them up.
SC.K.E.5.2:	Recognize the repeating pattern of day and night.
SC.K.E.5.3:	Recognize that the Sun can only be seen in the daytime.
SC.K.E.5.4:	Observe that sometimes the Moon can be seen at night and sometimes during the day.
SC.K.E.5.5:	Observe that things can be big and things can be small as seen from Earth.
SC.K.E.5.6:	Observe that some objects are far away and some are nearby as seen from Earth.
SC.K.N.1.1:	Collaborate with a partner to collect information.
SC.K.N.1.2:	Make observations of the natural world and know that they are descriptors collected using the five senses.
SC.K.N.1.3:	Keep records as appropriate such as pictorial records of investigations conducted.
SC.K.N.1.4:	Observe and create a visual representation of an object which includes its major features.
SC.K.N.1.5:	Recognize that learning can come from careful observation.
SC.K.P.8.1:	Sort objects by observable properties, such as size, shape, color, temperature (hot or cold), weight (heavy or light) and texture.
SC.K.P.9.1:	Recognize that the shape of materials such as paper and clay can be changed by cutting, tearing, crumpling, smashing, or rolling.
SC.K.P.10.1:	Observe that things that make sound vibrate.
SC.K.P.12.1:	Investigate that things move in different ways, such as fast, slow, etc.
SC.K.P.13.1:	Observe that a push or a pull can change the way an object is moving.
SC.K2.CS-CC.1.3:	Collaborate and cooperate with peers, teachers, and others using technology to solve problems.
SC.K2.CS-CP.1.1:	Identify different kinds of data (e.g., text, charts, graphs, numbers, pictures, audio, video, and collections of objects).
SC.K2.CS-CP.2.2:	Perform a simple task (e.g., making a sandwich and brushing teeth) breaking it into small steps.
SC.K2.CS-CP.3.1:	Create developmentally appropriate multimedia products with support from teachers, family members, or student partners.
SC.K2.CS-CS.2.2:	Solve age-appropriate problems (e.g., puzzles and logical thinking programs) with or without technology (i.e., computational thinking).
SC.K2.CS-CS.2.5:	Create a simple algorithm, individually and collaboratively, without using computers to complete the task (e.g., making a sandwich, getting ready for school).
SC.K2.CS-CS.3.1:	Create a digital artifact (independently and collaboratively) that clearly expresses thoughts and ideas.
SC.K2.CS-CS.4.1:	Recognize different kinds of computing devices in the classroom and other places (e.g., laptops, tablets, smart phones, desktops, printers).
SC.K2.CS-PC.2.2:	Communicate about technology using developmentally appropriate terminology.
MA.K12.MTR.1.1:	 Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach. Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve.
	Recognize students' effort when solving challenging problems.
	 Build understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations.
MA.K12.MTR.2.1:	 Choose a representation based on the given context or purpose.
	 Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:
	 Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence.

MA.K12.MTR.3.1:	 Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations.
	Clarifications: Teachers who encourage students to complete tasks with mathematical fluency:
	 Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
	Offer multiple opportunities for students to practice efficient and generalizable methods.
	• Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
	Communicate mathematical ideas, vocabulary and methods effectively.
	Analyze the mathematical thinking of others.
	Compare the efficiency of a method to those expressed by others.
	Recognize errors and suggest now to correctly solve the task.
MA.K12.MTR.4.1:	 Construct possible arguments based on evidence.
	Clarifications:
	Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:
	• Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.
	Create opportunities for students to discuss their thinking with peers.
	 Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to institute methods and compare their responses to the responses of their peers.
	Develop students ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
	Focus on relevant details within a problem.
	Create plans and procedures to logically order events, steps or ideas to solve problems.
	Decompose a complex problem into manageable parts.
	Relate previously learned concepts to new concepts.
MA.K12.MTR.5.1:	Look for similarities among problems. Connect solutions of problems to more complicated large scale situations
	Clarifications:
	Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:
	Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
	Support students to develop generalizations based on the similarities found among problems.
	Provide opportunities for students to create plans and procedures to solve problems.
	• Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
	Estimate to discover possible solutions.
	Use benchmark quantities to determine if a solution makes sense.
	Check calculations when solving problems.
	Verify possible solutions by explaining the methods used.
MA.K12.MTR.6.1:	Evaluate results based on the given context.
	Clarifications:
	Have students estimate or predict solutions prior to solving
	 Prompt students to continually ask, "Does this solution make sense? How do you know?"
	Reinforce that students check their work as they progress within and after a task.
	• Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts:
	Connect mathematical concepts to everyday experiences
	Use models and methods to understand, represent and solve problems.
MA K12 MTR 7 1	Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or
	efficiency.
	Clarifications:
	Teachers who encourage students to apply mathematics to real-world contexts:
	 Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods.
	 Support students as they validate conclusions by comparing them to the given situation.
	Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details
	from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.
	2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In
	3rd grade, students should use a combination of direct and indirect citations.

ELA.K12.EE.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.

VERSION DESCRIPTION

Special Notes:

This course offers students an opportunity to deepen science, mathematics, engineering, and technology skills. The primary content focus will be to expand knowledge of current grade level standards in mathematics and science by applying that content in a real world, hands-on situation involving engineering and technology. For kindergarten, themes will focus on the investigation of number sense, measurement, geometry, earth science, and physical science concepts.

Students will participate in various hands-on STEM activities in this supplemental course to assist in the mastery of current grade level mathematics and science standards.

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

• Asking questions (for science) and defining problems (for engineering).

- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

English Language Development (ELD) Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English Language Learners (ELL) to communicate information, ideas and concepts for academic success in science and math. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL

supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

GENERAL INFORMATION

Course Number: 5020070

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades PreK to 5 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: STEM LAB K Course Length: Year (Y) Course Attributes: • Class Size Core Required

Course Status: State Board Approved

Educator Certifications

Elementary Education (Grades K-6) Prekindergarten/Primary Education (Age 3 through Grade 3)

STEM Lab Grade 1 (#5020080) 2016 - 2022 (current)

Name	Description
SC.1.E.5.1:	Observe and discuss that there are more stars in the sky than anyone can easily count and that they are not scattered evenly in the sky.
SC.1.E.5.2:	Explore the Law of Gravity by demonstrating that Earth's gravity pulls any object on or near Earth toward it even though nothing is touching the object.
SC.1.E.5.3:	Investigate how magnifiers make things appear bigger and help people see things they could not see without them.
SC.1.L.14.1:	Make observations of living things and their environment using the five senses.
SC.1.L.14.2:	Identify the major parts of plants, including stem, roots, leaves, and flowers.
SC.1.L.14.3:	Differentiate between living and nonliving things.
SC.1.L.16.1:	Make observations that plants and animals closely resemble their parents, but variations exist among individuals within a population.
SC.1.L.17.1:	Through observation, recognize that all plants and animals, including humans, need the basic necessities of air, water, food, and space.
SC.1.N.1.1:	Raise questions about the natural world, investigate them in teams through free exploration, and generate appropriate explanations based on those explorations.
SC.1.N.1.2:	Using the five senses as tools, make careful observations, describe objects in terms of number, shape, texture, size, weight, color, and motion, and compare their observations with others.
SC.1.N.1.3:	Keep records as appropriate - such as pictorial and written records - of investigations conducted.
SC.1.N.1.4:	Ask "how do you know?" in appropriate situations.
SC.1.P.8.1:	Sort objects by observable properties, such as size, shape, color, temperature (hot or cold), weight (heavy or light), texture, and whether objects sink or float.
SC.1.P.12.1:	Demonstrate and describe the various ways that objects can move, such as in a straight line, zigzag, back-and-forth, round-and-round, fast, and slow.
SC.1.P.13.1:	Demonstrate that the way to change the motion of an object is by applying a push or a pull.
SC.K2.CS-CC.1.1:	Identify a variety of digital tools used for communication and collaboration (e.g., online library catalogs and databases).
SC.K2.CS-CC.1.3:	Collaborate and cooperate with peers, teachers, and others using technology to solve problems.
SC.K2.CS-CP.1.1:	Identify different kinds of data (e.g., text, charts, graphs, numbers, pictures, audio, video, and collections of objects).
SC.K2.CS-CP.1.3:	Propose a solution to a problem or question based on an analysis of the data and critical thinking, individually and collaboratively.
SC.K2.CS-CP.1.4:	Create data visualizations (e.g., charts and infographics), individually and collaboratively.
SC.K2.CS-CP.2.2:	Perform a simple task (e.g., making a sandwich and brushing teeth) breaking it into small steps.
SC.K2.CS-CP.3.1:	Create developmentally appropriate multimedia products with support from teachers, family members, or student partners.
SC.K2.CS-CP.3.2:	Prepare a simple presentation of digital products and applications.
SC.K2.CS-CS.2.2:	Solve age-appropriate problems (e.g., puzzles and logical thinking programs) with or without technology (i.e., computational thinking).
SC.K2.CS-CS.2.5:	Create a simple algorithm, individually and collaboratively, without using computers to complete the task (e.g., making a sandwich, getting ready for school).
SC.K2.CS-CS.2.6:	Illustrate thoughts, ideas, and stories in a step-by-step manner using writing tools, digital cameras, and drawing tools.
SC.K2.CS-CS.2.8:	Gather and organize information using concept-mapping tools.
SC.K2.CS-CS.3.2:	Create, review, and revise artifacts that include text, images, and audio using digital tools.
SC.K2.CS-CS.4.2:	Recognize and operate different types of computers, applications and peripherals (e.g., use input/output devices such as a mouse, keyboard, or touch screen; find, navigate, launch a program).
MAFS.1.G.1.1:	Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.
MAFS.1.G.1.2:	Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.
MAFS.1.MD.1.1:	Order three objects by length; compare the lengths of two objects indirectly by using a third object. Understand how to use a ruler to measure length to the nearest inch.
MAFS.1.MD.1.a:	 a. Recognize that the ruler is a tool that can be used to measure the attribute of length. b. Understand the importance of the zero point and end point and that the length measure is the span between two points. c. Recognize that the units marked on a ruler have equal length intervals and fit together with no gaps or overlaps. These equal interval distances can be counted to determine the overall length of an object.
MAFS.1.MD.3.4:	Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.
	Understand that the two digits of a two-digit number represent amounts of tens and ones. a. 10 can be thought of as a bundle of ten ones — called a "ten "
	a. To can be chought of as a bundle of ten ones — called a tent.
MAFS.1.NBT.2.2:	 c. The numbers from FF10 19 are composed of a terraind one, two, three, four, five, six, seven, eight, of nine ones. c. The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones). d. Decompose two-digit numbers in multiple ways (e.g., 64 can be decomposed into 6 tens and 4 ones or into 5 tens and 14 ones).
MAES 1 NRT 2 3	Compare two two digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols and a
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.

VERSION DESCRIPTION

This course offers students an opportunity to deepen science, mathematics, engineering, and technology skills. The primary content focus will be to expand knowledge of current grade level standards in mathematics and science by applying that content in a real world, hands-on situation involving engineering and technology. For first grade, themes will focus on the investigation of number sense, measurement, geometry, earth science, life science, and physical science concepts.

Students will participate in various hands-on STEM activities in this supplemental course to assist in the mastery of current grade level mathematics and science standards.

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

English Language Development (ELD) Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English Language Learners (ELL) to communicate information, ideas and concepts for academic success in science and math. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

GENERAL INFORMATION

Course Number: 5020080

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades PreK to 5 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: STEM Lab 1 Course Length: Year (Y) Course Attributes: • Class Size Core Required

Course Status: Course Approved

Educator Certifications

Elementary Education (Elementary Grades 1-6)	
Elementary Education (Grades K-6)	

STEM Lab Grade 1 (#5020080) 2022 - And Beyond

Name	Description
SC.1.E.5.1:	Observe and discuss that there are more stars in the sky than anyone can easily count and that they are not scattered evenly in the sky.
SC.1.E.5.2:	Explore the Law of Gravity by demonstrating that Earth's gravity pulls any object on or near Earth toward it even though nothing is touching the object
SC.1.F.5.3:	Investigate how magnifiers make things appear bigger and help people see things they could not see without them.
SC.1.1.14.1:	Make observations of living things and their environment using the five senses.
SC 11 14 2	Identify the major parts of plants, including stem, roots, leaves, and flowers
SC 1 14 3	Differentiate between living and nonliving things
SC 1 L 16 1	Make observations that plants and animals closely resemble their parents, but variations exist among individuals within a population
SC 1 17 1	Through observation recognize that all plants and animals including humans, need the basic necessities of air, water, food, and space
SC.1.N.1.1:	Raise questions about the natural world, investigate them in teams through free exploration, and generate appropriate explanations based on those explorations.
SC.1.N.1.2:	Using the five senses as tools, make careful observations, describe objects in terms of number, shape, texture, size, weight, color, and motion, and compare their observations with others.
SC.1.N.1.3:	Keep records as appropriate - such as pictorial and written records - of investigations conducted.
SC.1.N.1.4:	Ask "how do you know?" in appropriate situations.
SC.1.P.8.1:	Sort objects by observable properties, such as size, shape, color, temperature (hot or cold), weight (heavy or light), texture, and whether objects sink or float.
SC.1.P.12.1:	Demonstrate and describe the various ways that objects can move, such as in a straight line, zigzag, back-and-forth, round-and-round, fast, and slow.
SC.1.P.13.1:	Demonstrate that the way to change the motion of an object is by applying a push or a pull.
SC.K2.CS-CC.1.1:	Identify a variety of digital tools used for communication and collaboration (e.g., online library catalogs and databases).
SC.K2.CS-CC.1.3:	Collaborate and cooperate with peers, teachers, and others using technology to solve problems.
SC.K2.CS-CP.1.1:	Identify different kinds of data (e.g., text, charts, graphs, numbers, pictures, audio, video, and collections of objects).
SC.K2.CS-CP.1.3:	Propose a solution to a problem or question based on an analysis of the data and critical thinking, individually and collaboratively.
SC.K2.CS-CP.1.4:	Create data visualizations (e.g., charts and infographics), individually and collaboratively.
SC.K2.CS-CP.2.2:	Perform a simple task (e.g., making a sandwich and brushing teeth) breaking it into small steps.
SC.K2.CS-CP.3.1:	Create developmentally appropriate multimedia products with support from teachers, family members, or student partners.
SC.K2.CS-CP.3.2:	Prepare a simple presentation of digital products and applications.
SC.K2.CS-CS.2.2:	Solve age-appropriate problems (e.g., puzzles and logical thinking programs) with or without technology (i.e., computational thinking).
SC.K2.CS-CS.2.5:	Create a simple algorithm, individually and collaboratively, without using computers to complete the task (e.g., making a sandwich, getting ready for school).
SC.K2.CS-CS.2.6:	Illustrate thoughts, ideas, and stories in a step-by-step manner using writing tools, digital cameras, and drawing tools.
SC.K2.CS-CS.2.8:	Gather and organize information using concept-mapping tools.
SC.K2.CS-CS.3.2:	Create, review, and revise artifacts that include text, images, and audio using digital tools.
SC.K2.CS-CS.4.2:	Recognize and operate different types of computers, applications and peripherals (e.g., use input/output devices such as a mouse, keyboard, or touch screen; find, navigate, launch a program).
	Mathematicians who participate in effortful learning both individually and with others:
	Analyze the problem in a way that makes sense given the task.
	Ask questions that will help with solving the task.
	Build perseverance by modifying methods as needed while solving a challenging task.
	 Stay engaged and maintain a positive mindset when working to solve tasks.
	Help and support each other when attempting a new method or approach.
MA.K12.MTR.1.1:	Clarifications
	Teachers who encourage students to participate actively in effortful learning both individually and with others:
	Cultivate a community of growth mindset learners.
	Eoster perseverance in students by choosing tasks that are challenging.
	Develop students' ability to analyze and problem solve
	Recognize students' effort when solving challenging problems.
MA K12 MTR 2 1-	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:
	Build understanding through modeling and using manipulatives.
	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
	 Progress from modeling problems with objects and drawings to using algorithms and equations.
	Express connections between concents and representations
	Choose a representation based on the given context or purpose
1917 A.IX 12.19111A.Z. 1.	
	Utartifications:
	Help students make connections between concepts and conceptations
	 Theip students make connections between concepts and representations. Dravida appentuation for students to use manipulatives when investigations.
1	 Provide opportunities for students to use manipulatives when investigating concepts.

	 Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
	 Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context.
MA.K12.MTR.3.1:	 Adapt proceedings to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	 Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods.

	 Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning.
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.

VERSION DESCRIPTION

This course offers students an opportunity to deepen science, mathematics, engineering, and technology skills. The primary content focus will be to expand knowledge of current grade level standards in mathematics and science by applying that content in a real world, hands-on situation involving engineering and technology. For first grade, themes will focus on the investigation of number sense, measurement, geometry, earth science, life science, and physical science concepts.

Students will participate in various hands-on STEM activities in this supplemental course to assist in the mastery of current grade level mathematics and science standards.

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).

- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

English Language Development (ELD) Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English Language Learners (ELL) to communicate information, ideas and concepts for academic success in science and math. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

GENERAL INFORMATION

Course Number: 5020080

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades PreK to 5 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: STEM Lab 1 Course Length: Year (Y) Course Attributes: • Class Size Core Required

Course Status: State Board Approved

Educator Certifications

Elementary Education (Elementary Grades 1-6) Elementary Education (Grades K-6)

STEM Lab Grade 2 (#5020090) 2016 - 2022 (current)

Name	Description
SC.2.E.6.1:	Recognize that Earth is made up of rocks. Rocks come in many sizes and shapes.
SC.2.E.6.2:	Describe how small pieces of rock and dead plant and animal parts can be the basis of soil and explain the process by which soil is formed.
SC.2.E.6.3:	Classify soil types based on color, texture (size of particles), the ability to retain water, and the ability to support the growth of plants.
SC.2.E.7.1:	Compare and describe changing patterns in nature that repeat themselves, such as weather conditions including temperature and precipitation, day to day and season to season.
SC.2.E.7.2:	Investigate by observing and measuring, that the Sun's energy directly and indirectly warms the water, land, and air.
SC.2.E.7.3:	Investigate, observe and describe how water left in an open container disappears (evaporates), but water in a closed container does not disappear (evaporate).
SC.2.E.7.4:	Investigate that air is all around us and that moving air is wind.
SC.2.N.1.1:	Raise questions about the natural world, investigate them in teams through free exploration and systematic observations, and generate appropriate explanations based on those explorations.
SC.2.N.1.2:	Compare the observations made by different groups using the same tools.
SC.2.N.1.3:	Ask "how do you know?" in appropriate situations and attempt reasonable answers when asked the same question by others.
SC.2.N.1.4:	Explain how particular scientific investigations should yield similar conclusions when repeated.
SC.2.N.1.5:	Distinguish between empirical observation (what you see, hear, feel, smell, or taste) and ideas or inferences (what you think).
SC.2.N.1.6:	Explain how scientists alone or in groups are always investigating new ways to solve problems.
SC.2.P.8.1:	Observe and measure objects in terms of their properties, including size, shape, color, temperature, weight, texture, sinking or floating in water, and attraction and repulsion of magnets.
SC.2.P.8.2:	Identify objects and materials as solid, liquid, or gas.
SC.2.P.8.3:	Recognize that solids have a definite shape and that liquids and gases take the shape of their container.
SC.2.P.8.4:	Observe and describe water in its solid, liquid, and gaseous states.
SC.2.P.8.5:	Measure and compare temperatures taken every day at the same time.
SC.2.P.8.6:	Measure and compare the volume of liquids using containers of various shapes and sizes.
SC.2.P.9.1:	Investigate that materials can be altered to change some of their properties, but not all materials respond the same way to any one alteration.
SC.2.P.10.1:	Discuss that people use electricity or other forms of energy to cook their food, cool or warm their homes, and power their cars.
SC.2.P.13.1:	Investigate the effect of applying various pushes and pulls on different objects.
SC.2.P.13.2:	Demonstrate that magnets can be used to make some things move without touching them.
SC.2.P.13.3:	Recognize that objects are pulled toward the ground unless something holds them up.
SC.2.P.13.4:	Demonstrate that the greater the force (push or pull) applied to an object, the greater the change in motion of the object.
SC.K2.CS-CC.1.2:	Conduct basic keyword searches, and exchange information and feedback with teachers and other students (e.g., e-mail and text messaging).
SU.K2.US-UU.1.3:	Collaborate and cooperate with peers, teachers, and others using technology to solve problems.
SU.K2.US-UU.1.4:	Provide and accept constructive children on a collaborative project.
SC.K2.C3-CP.2.1.	Construct a simple program using tools that do not require a textual programming language (e.g. block based programming language)
SC K2 CS-CP 3 1	Create developmentally appropriate multimedia products with support from teachers, family members, or student partners
SC K2 CS-CP 3 2	Prepare a simple presentation of digital products and applications
SC K2 CS-CS 1 1	Define simulation and identify the concepts illustrated by a simple simulation (e.g. growth human health, and the butterfly life cycle)
SC.K2.CS-CS.1.3:	Describe how models represent a real-life system (e.g., globe or map).
SC.K2.CS-CS.2.1:	Arrange or sort information into useful order, such as sorting students by birth date, with or without technology.
SC.K2.CS-CS.2.2:	Solve age-appropriate problems (e.g., puzzles and logical thinking programs) with or without technology (i.e., computational thinking).
SC.K2.CS-CS.2.4:	Define an algorithm as a sequence of defined steps.
SC.K2.CS-CS.2.6:	Illustrate thoughts, ideas, and stories in a step-by-step manner using writing tools, digital cameras, and drawing tools.
SC.K2.CS-CS.2.7:	Develop and present an algorithm using tangible materials.
SC.K2.CS-CS.3.1:	Create a digital artifact (independently and collaboratively) that clearly expresses thoughts and ideas.
SC.K2.CS-CS.3.2:	Create, review, and revise artifacts that include text, images, and audio using digital tools.
SC.K2.CS-CS.4.3:	Explain that a computer program is running when a program or command is executed.
MAFS.2.MD.1.1:	Measure the length of an object to the nearest inch, foot, centimeter, or meter by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.
MAFS.2.MD.1.2:	Describe the inverse relationship between the size of a unit and number of units needed to measure a given object. Example: Suppose the perimeter of a room is lined with one-foot rulers. Now, suppose we want to line it with yardsticks instead of rulers. Will we need more or fewer yardsticks than rulers to do the job? Explain your answer.
MAFS.2.MD.1.3:	Estimate lengths using units of inches, feet, yards, centimeters, and meters.
MAFS.2.MD.1.4:	Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.
MAFS.2.MD.2.5:	Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.
MAFS.2.MD.2.6:	Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2,, and represent whole number sums and differences within 100 on a number line diagram.
MAFS.2.MD.4.9:	Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.

MAFS.2.MD.4.10:	Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.
MAFS.2.NBT.1.2:	Count within 1000; skip-count by 5s, 10s, and 100s.
MAFS.2.NBT.1.3:	Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.
MAFS.2.NBT.1.4:	Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.
MAFS.2.NBT.2.5:	Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
MAFS.2.NBT.2.6:	Add up to four two-digit numbers using strategies based on place value and properties of operations.
MAFS.2.OA.2.2:	Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers.
FLD K12 FLL SC 1	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science

VERSION DESCRIPTION

This course offers students an opportunity to deepen science, mathematics, engineering, and technology skills. The primary content focus will be to expand knowledge of current grade level standards in mathematics and science by applying that content in a real world, hands-on situation involving engineering and technology. For second grade, themes will focus on the investigation of number sense, measurement, earth science, and physical science concepts.

Students will participate in various hands-on STEM activities in this supplemental course to assist in the mastery of current grade level mathematics and science standards.

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

English Language Development (ELD) Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English Language Learners (ELL) to communicate information, ideas and concepts for academic success in science and math. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

GENERAL INFORMATION

Course Number: 5020090
Course Number: 5020090
Course Number: 5020090
Course S Grade Group: Grades PreK to 5 Education
Courses > Subject: Science > SubSubject: General
Sciences >
Abbreviated Title: STEM LAB 2
Course Length: Year (Y)
Course Attributes:
• Class Size Core Required

Course Status: Course Approved

Educator Certifications

Elementary Education (Elementary Grades 1-6)

Elementary Education (Grades K-6)

STEM Lab Grade 2 (#5020090) 2022 - And Beyond

Name	Description
SC.2.E.6.1:	Recognize that Earth is made up of rocks. Rocks come in many sizes and shapes.
SC.2.E.6.2:	Describe how small pieces of rock and dead plant and animal parts can be the basis of soil and explain the process by which soil is formed.
SC.2.E.6.3:	Classify soil types based on color, texture (size of particles), the ability to retain water, and the ability to support the growth of plants.
000574	Compare and describe changing patterns in nature that repeat themselves, such as weather conditions including temperature and precipitation, day
SC.2.E.7.1:	to day and season to season.
SC.2.E.7.2:	Investigate by observing and measuring, that the Sun's energy directly and indirectly warms the water, land, and air.
SC 2 F 7 2.	Investigate, observe and describe how water left in an open container disappears (evaporates), but water in a closed container does not disappear
30.2.E.7.3.	(evaporate).
SC.2.E.7.4:	Investigate that air is all around us and that moving air is wind.
SC.2.N.1.1:	Raise questions about the natural world, investigate them in teams through free exploration and systematic observations, and generate appropriate explanations based on those explorations.
SC.2.N.1.2:	Compare the observations made by different groups using the same tools.
SC.2.N.1.3:	Ask "how do you know?" in appropriate situations and attempt reasonable answers when asked the same question by others.
SC.2.N.1.4:	Explain how particular scientific investigations should yield similar conclusions when repeated.
SC.2.N.1.5:	Distinguish between empirical observation (what you see, hear, feel, smell, or taste) and ideas or inferences (what you think).
SC.2.N.1.6:	Explain how scientists alone or in groups are always investigating new ways to solve problems.
	Observe and measure objects in terms of their properties, including size, shape, color, temperature, weight, texture, sinking or floating in water, and
SC.2.P.8.1:	attraction and repulsion of magnets.
SC.2.P.8.2:	Identify objects and materials as solid, liquid, or gas.
SC.2.P.8.3:	Recognize that solids have a definite shape and that liquids and gases take the shape of their container.
SC.2.P.8.4:	Observe and describe water in its solid, liquid, and gaseous states.
SC.2.P.8.5:	Measure and compare temperatures taken every day at the same time.
SC.2.P.8.6:	Measure and compare the volume of liquids using containers of various shapes and sizes.
SC.2.P.9.1:	Investigate that materials can be altered to change some of their properties, but not all materials respond the same way to any one alteration.
SC.2.P.10.1:	Discuss that people use electricity or other forms of energy to cook their food, cool or warm their homes, and power their cars.
SC.2.P.13.1:	Investigate the effect of applying various pushes and pulls on different objects.
SC 2 P 13 2	Demonstrate that magnets can be used to make some things move without touching them
SC 2 P 13 3	Recognize that objects are pulled toward the ground unless something holds them up
SC 2 P 13 A	Demonstrate that the greater the force (nush or null) annied to an object, the greater the change in motion of the object
SC K2 CS-CC 1 2	Conduct basic keyword searches, and exchange information and feedback with teachers and other students (e.g., e-mail and text messaging)
SC K2 CS-CC 1 3	Collaborate and cooperate with peers teachers, and others using technology to solve problems
SC K2 CS-CC 1 A:	Provide and accent constructive criticism on a collaborative project
SC K2 CS-CP 2 1	Define a computer program as a set of commands created by people to do something
SC K2 CS CD 2 4	Construct a simple program using tools that do not require a textual programming language (e.g. block based programming language)
SC K2 CS CD 2 1	Create developmentally appropriate multimedia products with support from teachers, family members, or student partners
SC K2 CS CD 2 2	Drepare a simple presentation of digital products and applications
SC.K2.C3-CF.J.2.	Prepare a simple presentation or digital products and applications.
SC.K2.C3-C3.1.1.	Describe how models represent a real life system (e.g., globe or man)
SC.K2.C3-C3.1.3.	Arrange or sort information into useful order, such as serting students by birth date, with or without technology
SC.K2.CS-CS.2.1.	All ange or sort information into useful order, such as softing students by birth date, with or without technology.
SU.K2.US-US.2.2:	Solve age-appropriate problems (e.g., puzzles and logical minking programs) with or without technology (i.e., computational minking).
SU.K2.US-US.2.4:	Derine an algorithm as a sequence of defined steps.
SU.K2.US-US.2.6:	liliustrate thoughts, ideas, and stories in a step-by-step manner using writing tools, digital cameras, and drawing tools.
SU.K2.US-US.2.7:	Develop and present an algorithm using tangible materials.
SU.K2.US-US.3.1:	Create a digital artifract (independentity and collaboratively) that clearly expresses thoughts and ideas.
SC.K2.CS-CS.3.2:	Create, review, and revise artifacts that include text, images, and audio using digital tools.
SC.K2.CS-CS.4.3:	Explain that a computer program is running when a program or command is executed.
	Mathematicians who participate in effortful learning both individually and with others:
	Analyze the problem in a way that makes sense given the task.
	Ask questions that will help with solving the task.
	Build perseverance by modifying methods as needed while solving a challenging task.
	Stay engaged and maintain a positive mindset when working to solve tasks.
MA.K12.MTR.1.1:	 Help and support each other when attempting a new method or approach.
	Clarifications:
	Teachers who encourage students to participate actively in effortful learning both individually and with others:
	Cultivate a community of growth mindset learners.
	Foster perseverance in students by choosing tasks that are challenging.
	Develop students' ability to analyze and problem solve.
	Recognize students' effort when solving challenging problems.
	Demonstrate understanding hu representing problems in multiple upon

MA.K12.MTR.2.1:	 Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose.
	 Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a pow captor.
MA.K12.MTR.3.1:	 Adapt proceedings to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence.
	 Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. Clarifications:
	 Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. Clarifications:
	 Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.

MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
	 Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.

VERSION DESCRIPTION

This course offers students an opportunity to deepen science, mathematics, engineering, and technology skills. The primary content focus will be to expand knowledge of current grade level standards in mathematics and science by applying that content in a real world, hands-on situation involving engineering and technology. For second grade, themes will focus on the investigation of number sense, measurement, earth science, and physical science concepts.

Students will participate in various hands-on STEM activities in this supplemental course to assist in the mastery of current grade level mathematics and science standards.

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.

- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

English Language Development (ELD) Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English Language Learners (ELL) to communicate information, ideas and concepts for academic success in science and math. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:

https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

GENERAL INFORMATION

Course Number: 5020090

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades PreK to 5 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: STEM LAB 2 Course Length: Year (Y) **Course Attributes:** Class Size Core Required

Course Status: State Board Approved

Educator Certifications

Elementary Education (Elementary Grades 1-6) Elementary Education (Grades K-6)

STEM Lab Grade 3 (#5020100) 2016 - 2022 (current)

Name	Description
SC.3.L.14.1:	Describe structures in plants and their roles in food production, support, water and nutrient transport, and reproduction.
SC.3.L.14.2:	Investigate and describe how plants respond to stimuli (heat, light, gravity), such as the way plant stems grow toward light and their roots grow downward in response to gravity.
SC.3.L.15.1:	Classify animals into major groups (mammals, birds, reptiles, amphibians, fish, arthropods, vertebrates and invertebrates, those having live births and those which lay eggs) according to their physical characteristics and behaviors.
SC.3.L.15.2:	Classify flowering and nonflowering plants into major groups such as those that produce seeds, or those like ferns and mosses that produce spores, according to their physical characteristics.
SC.3.L.17.1:	Describe how animals and plants respond to changing seasons.
SC.3.L.17.2:	Recognize that plants use energy from the Sun, air, and water to make their own food.
SC.3.N.1.1:	Raise questions about the natural world, investigate them individually and in teams through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.
SC.3.N.1.2:	Compare the observations made by different groups using the same tools and seek reasons to explain the differences across groups.
SC.3.N.1.3:	Keep records as appropriate, such as pictorial, written, or simple charts and graphs, of investigations conducted.
SC.3.N.1.4:	Recognize the importance of communication among scientists.
SC.3.N.1.5:	Recognize that scientists question, discuss, and check each other's evidence and explanations.
SC.3.N.1.6:	Infer based on observation.
SC.3.N.1.7:	Explain that empirical evidence is information, such as observations or measurements, that is used to help validate explanations of natural phenomena.
SC.3.N.3.1:	Recognize that words in science can have different or more specific meanings than their use in everyday language; for example, energy, cell, heat/cold, and evidence.
SC.3.N.3.2:	Recognize that scientists use models to help understand and explain how things work.
SC.3.N.3.3:	Recognize that all models are approximations of natural phenomena; as such, they do not perfectly account for all observations.
SC.3.P.8.1:	Measure and compare temperatures of various samples of solids and liquids.
SC.3.P.8.2:	Measure and compare the mass and volume of solids and liquids.
SC.3.P.8.3:	Compare materials and objects according to properties such as size, shape, color, texture, and hardness.
SC.3.P.9.1:	Describe the changes water undergoes when it changes state through heating and cooling by using familiar scientific terms such as melting, freezing, boiling, evaporation, and condensation.
SC.3.P.10.1:	Identify some basic forms of energy such as light, heat, sound, electrical, and mechanical.
SC.3.P.10.2:	Recognize that energy has the ability to cause motion or create change.
SC.3.P.10.3:	Demonstrate that light travels in a straight line until it strikes an object or travels from one medium to another.
SC.3.P.10.4:	Demonstrate that light can be reflected, refracted, and absorbed.
SC.3.P.11.1:	Investigate, observe, and explain that things that give off light often also give off heat.
SC.3.P.11.2:	Investigate, observe, and explain that heat is produced when one object rubs against another, such as rubbing one's hands together.
SC.35.CS-CC.1.1:	Identify technology tools for individual and collaborative data collection, writing, communication, and publishing activities.
SC.35.CS-CC.1.2:	Describe key ideas and details while working individually or collaboratively using digital tools and media-rich resources in a way that informs, persuades, and/or entertains.
SC.35.CS-CC.1.3:	Identify ways that technology can foster teamwork, and collaboration can support problem solving and innovation.
SC.35.CS-CP.1.2:	Identify and describe examples of databases from everyday life (e.g., library catalogs, school records, telephone directories, and contact lists).
SC.35.CS-CP.1.3:	Identify, research, and collect a data set on a topic, issue, problem, or question using age-appropriate technologies.
SC.35.CS-CP.1.4:	Collect, organize, graph, and analyze data to answer a question using a database or spreadsheet.
SC.35.CS-CP.2.4:	Explain that programs need known initial conditions (e.g., set initial score to zero in a game, initialize variables, or initial values set by hardware input).
SC.35.CS-CP.2.5:	Detect and correct program errors, including those involving arithmetic operators, conditionals, and repetition, using interactive debugging.
SC.35.CS-CP.3.1:	Write, communicate and publish activities using technology tools.
SC.35.CS-CP.3.2:	Present digitally created products, either individually and collaboratively, where a topic, concept, or skill is carefully analyzed or thoughtfully explored.
SC.35.CS-CS.1.1:	Identify the concepts illustrated by a simulation (e.g., ecosystem, predator/prey, and invasive species).
SC.35.CS-CS.1.3:	Answer a question, individually and collaboratively, using data from a simulation.
SC.35.CS-CS.1.4:	Create a simple model of a system (e.g., flower or solar system) and explain what the model shows and does not show.
SC.35.CS-CS.2.1:	Solve age-appropriate problems using information organized using digital graphic organizers (e.g., concept maps and Venn-diagrams).
SC.35.CS-CS.2.3:	Explain the process of arranging or sorting information into useful order as well as the purpose for doing so.
SC.35.CS-CS.3.1:	Manipulate and publish multimedia artifacts using digital tools (local and online).
SC.35.CS-CS.3.2:	Create an artifact (independently and collaboratively) that answers a research question clearly communicating thoughts and ideas.
SC.35.CS-CS.6.1:	Describe how hardware applications (e.g., Global Positioning System (GPS) navigation for driving directions, text-to-speech translation, and language translation) can enable everyone to do things they could not do otherwise.
SC.35.CS-PC.2.6:	Communicate about technology using appropriate terminology.
SC.35.CS-PC.3.1:	Identify digital information resources used to answer research questions (e.g., online library catalog, online encyclopedias, databases, and websites).
SC.35.CS-PC.3.2:	Gather, organize, and analyze information from digital resources.
SC.35.CS-PC.3.3:	Compare digital resources for accuracy, relevancy, and appropriateness.
SC.35.CS-PC.4.1:	Describe the difference between digital artifacts that are open or free and those that are protected by copyright.

MAFS.3.G.1.2:	Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape.
	Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units.
MAFS.3.MD.1.2:	Clarifications: Examples of Opportunities for In-Depth Focus Continuous measurement quantities such as liquid volume, mass, and so on are an important context for fraction arithmetic (cf. 4.NF.2.4c.
	5.NF.2.7c, 5.NF.2.3). In grade 3, students begin to get a feel for continuous measurement quantities and solve whole- number problems involving such quantities.
MAFS.3.MD.2.3:	Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets.
MAFS.3.MD.2.4:	Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.
MAFS.3.NBT.1.1:	Use place value understanding to round whole numbers to the nearest 10 or 100.
	Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.
MAFS.3.NBT.1.2:	Clarifications: Students fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. (Although 3.OA.3.7 and 3.NBT.1.2 are both fluency standards, these two standards do not represent equal investments of time in grade 3. Note that students in grade 2 were already adding and subtracting within 1000, just not fluently. That makes 3.NBT.1.2 a relatively small and incremental expectation. By contrast, multiplication and division are new in grade 3, and meeting
MAES 2 NRT 1 2	The multiplication and division fluency standard 3.0A.3.7 with understanding is a major portion of students' work in grade 3.) Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of
MAFS.3.NF.1.1:	operations. Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b.
	 Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. b. Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model.
MAFS.3.NF.1.3:	 c. Express whole numbers as inactions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram. d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.

VERSION DESCRIPTION

This course offers students an opportunity to deepen science, mathematics, engineering, and technology skills. The primary content focus will be to expand knowledge of current grade level standards in mathematics and science by applying that content in a real world, hands-on situation involving engineering and technology. For third grade, themes will focus on the investigation of number sense, measurement, geometry, life science, and physical science concepts.

Students will participate in various hands-on STEM activities in this supplemental course to assist in the mastery of current grade level mathematics and science standards.

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- $\label{eq:constraint} \textbf{4. Emphasizing students supporting answers based upon evidence from the text.}$
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.
- English Language Development (ELD) Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English Language Learners (ELL) to communicate information, ideas and concepts for academic success in science and math. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

GENERAL INFORMATION	
Course Number: 5020100	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades PreK to 5 Education Courses > Subject: Science > SubSubject: General Sciences >
	Abbreviated Title: STEM LAB 3
	Course Length: Year (Y)
	Course Attributes:
	Class Size Core Required
Course Status: Course Approved	

Educator Certifications

Elementary	Education	(Elementary Grades 1-6)	
Elementary	Education	(Grades K-6)	

STEM Lab Grade 3 (#5020100) 2022 - And Beyond

Name	Description
SC.3.L.14.1:	Describe structures in plants and their roles in food production, support, water and nutrient transport, and reproduction.
SC.3.L.14.2:	Investigate and describe how plants respond to stimuli (heat, light, gravity), such as the way plant stems grow toward light and their roots grow downward in response to gravity.
SC.3.L.15.1:	Classify animals into major groups (mammals, birds, reptiles, amphibians, fish, arthropods, vertebrates and invertebrates, those having live births and those which lay eggs) according to their physical characteristics and behaviors.
SC.3.L.15.2:	Classify flowering and nonflowering plants into major groups such as those that produce seeds, or those like ferns and mosses that produce spores, according to their physical characteristics.
SC.3.L.17.1:	Describe how animals and plants respond to changing seasons.
SC.3.L.17.2:	Recognize that plants use energy from the Sun, air, and water to make their own food.
SC.3.N.1.1:	Raise questions about the natural world, investigate them individually and in teams through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.
SC.3.N.1.2:	Compare the observations made by different groups using the same tools and seek reasons to explain the differences across groups.
SC.3.N.1.3:	Keep records as appropriate, such as pictorial, written, or simple charts and graphs, of investigations conducted.
SC.3.N.1.4:	Recognize the importance of communication among scientists.
SC.3.N.1.5:	Recognize that scientists question, discuss, and check each other's evidence and explanations.
SC.3.N.1.6:	Infer based on observation.
SC.3.N.1.7:	Explain that empirical evidence is information, such as observations or measurements, that is used to help validate explanations of natural phenomena.
SC.3.N.3.1:	Recognize that words in science can have different or more specific meanings than their use in everyday language; for example, energy, cell, heat/cold, and evidence.
SC.3.N.3.2:	Recognize that scientists use models to help understand and explain how things work.
SC.3.N.3.3:	Recognize that all models are approximations of natural phenomena; as such, they do not perfectly account for all observations.
SC.3.P.8.1:	Measure and compare temperatures of various samples of solids and liquids.
SC.3.P.8.2:	Measure and compare the mass and volume of solids and liquids.
SC.3.P.8.3:	Compare materials and objects according to properties such as size, shape, color, texture, and hardness.
SC.3.P.9.1:	Describe the changes water undergoes when it changes state through heating and cooling by using familiar scientific terms such as melting, freezing, boiling, evaporation, and condensation.
SC.3.P.10.1:	Identify some basic forms of energy such as light, heat, sound, electrical, and mechanical.
SC.3.P.10.2:	Recognize that energy has the ability to cause motion or create change.
SC.3.P.10.3:	Demonstrate that light travels in a straight line until it strikes an object or travels from one medium to another.
SC.3.P.10.4:	Demonstrate that light can be reflected, refracted, and absorbed.
SC.3.P.11.1:	Investigate, observe, and explain that things that give off light often also give off heat.
SC.3.P.11.2:	Investigate, observe, and explain that heat is produced when one object rubs against another, such as rubbing one's hands together.
SC.35.CS-CC.1.1:	Identify technology tools for individual and collaborative data collection, writing, communication, and publishing activities.
SC.35.CS-CC.1.2:	Describe key ideas and details while working individually or collaboratively using digital tools and media-rich resources in a way that informs, persuades, and/or entertains.
SC.35.CS-CC.1.3:	Identify ways that technology can foster teamwork, and collaboration can support problem solving and innovation.
SC.35.CS-CP.1.2:	Identify and describe examples of databases from everyday life (e.g., library catalogs, school records, telephone directories, and contact lists).
SC.35.CS-CP.1.3:	Identify, research, and collect a data set on a topic, issue, problem, or question using age-appropriate technologies.
SC.35.CS-CP.1.4:	Collect, organize, graph, and analyze data to answer a question using a database or spreadsheet.
SC.35.CS-CP.2.4:	Explain that programs need known initial conditions (e.g., set initial score to zero in a game, initialize variables, or initial values set by hardware input).
SC.35.CS-CP.2.5:	Detect and correct program errors, including those involving arithmetic operators, conditionals, and repetition, using interactive debugging.
SC.35.CS-CP.3.1:	Write, communicate and publish activities using technology tools.
SC.35.CS-CP.3.2:	Present digitally created products, either individually and collaboratively, where a topic, concept, or skill is carefully analyzed or thoughtfully explored.
SC.35.CS-CS.1.1:	Identify the concepts illustrated by a simulation (e.g., ecosystem, predator/prey, and invasive species).
SC.35.CS-CS.1.3:	Answer a question, individually and collaboratively, using data from a simulation.
SC.35.CS-CS.1.4:	Create a simple model of a system (e.g., flower or solar system) and explain what the model shows and does not show.
SC.35.CS-CS.2.1:	Solve age-appropriate problems using information organized using digital graphic organizers (e.g., concept maps and Venn-diagrams).
SC.35.CS-CS.2.3:	Explain the process of arranging or sorting information into useful order as well as the purpose for doing so.
SC.35.CS-CS.3.1:	Manipulate and publish multimedia artifacts using digital tools (local and online).
SC.35.CS-CS.3.2:	Create an artifact (independently and collaboratively) that answers a research question clearly communicating thoughts and ideas.
SC.35.CS-CS.6.1:	Describe how hardware applications (e.g., Global Positioning System (GPS) navigation for driving directions, text-to-speech translation, and language translation) can enable everyone to do things they could not do otherwise.
SC.35.CS-PC.2.6:	Communicate about technology using appropriate terminology.
SC.35.CS-PC.3.1:	Identify digital information resources used to answer research questions (e.g., online library catalog, online encyclopedias, databases, and websites).
SC.35.CS-PC.3.2:	Gather, organize, and analyze information from digital resources.
SC.35.CS-PC.3.3:	Compare digital resources for accuracy, relevancy, and appropriateness.
SC.35.CS-PC.4.1:	Describe the difference between digital artifacts that are open or free and those that are protected by copyright.
	Mathematicians who participate in effortful learning both individually and with others:

MA.K12.MTR.1.1:	 Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach. Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions.
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
-------------------	--
	Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Indicate how various concepts can be applied to other disciplines. Cite evidence to explain and justify reasoning.
ELA.K12.EE.1.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.

VERSION DESCRIPTION

This course offers students an opportunity to deepen science, mathematics, engineering, and technology skills. The primary content focus will be to expand knowledge of current grade level standards in mathematics and science by applying that content in a real world, hands-on situation involving engineering and technology. For third grade, themes will focus on the investigation of number sense, measurement, geometry, life science, and physical science concepts.

Students will participate in various hands-on STEM activities in this supplemental course to assist in the mastery of current grade level mathematics and science standards.

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

· Asking questions (for science) and defining problems (for engineering).

- · Developing and using models
- · Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information

English Language Development (ELD) Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English Language Learners (ELL) to communicate information, ideas and concepts for academic success in science and math. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:

https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: E020100	Courses > Grade Group: Grades PreK to 5 Education
Course Number: 5020100	Courses > Subject : Science > SubSubject : General
	Sciences >
	Abbreviated Title: STEM LAB 3
	Course Length: Year (Y)
	Course Attributes:
	Class Size Core Required
Course Status: State Board Approved	

Educator Certifications

Elementary Education (Elementary Grades 1-6)
Elementary Education (Grades K-6)

STEM Lab Grade 4 (#5020110) 2016 - 2022 (current)

Course Standards

Name	Description
SC.35.CS-CC.1.1:	Identify technology tools for individual and collaborative data collection, writing, communication, and publishing activities.
SC.35.CS-CC.1.2:	Describe key ideas and details while working individually or collaboratively using digital tools and media-rich resources in a way that informs,
CO 25 00 00 1 2	persuades, and/or entertains.
SU.35.US-UU.1.3:	Identity ways that technology can roster teamwork, and conaboration can support problem solving and innovation.
SC.35.CS-CC.1.5:	Explain that providing and receiving reedback from others can improve performance and outcomes for collaborative digital projects.
SC.35.CS-CP.1.2:	Identify and describe examples of databases in one everyday life (e.g., library catalogs, school records, telephone directories, and contact lists).
SC 25 CS CD 1 4	Collect, arganize, graph, and analyze data to answer a question using a database or spreadsheet.
SC 25 CS CD 2 1	Derform keybearding skills for communication and the input of data and information
SC 35 CS CD 2 2	Create test and modify a program in a graphical environment (e.g. block based visual programming language) individually and collaboratively
SC.35.CS-CP.2.4:	Explain that programs need known initial conditions (e.g., set initial score to zero in a game, initialize variables, or initial values set by hardware input)
SC 35 CS-CP 2 5	Detect and correct program errors, including those involving arithmetic operators, conditionals, and repetition, using interactive debugging
SC.35.CS-CP.3.1:	Write, communicate and publish activities using technology tools.
SC.35.CS-CP.3.2:	Present digitally created products, either individually and collaboratively, where a topic, concept, or skill is carefully analyzed or thoughtfully explored.
SC.35.CS-CS.1.1:	Identify the concepts illustrated by a simulation (e.g., ecosystem, predator/prey, and invasive species).
SC.35.CS-CS.1.3:	Answer a guestion, individually and collaboratively, using data from a simulation.
SC.35.CS-CS.1.4:	Create a simple model of a system (e.g., flower or solar system) and explain what the model shows and does not show.
SC.35.CS-CS.2.1:	Solve age-appropriate problems using information organized using digital graphic organizers (e.g., concept maps and Venn-diagrams).
SC.35.CS-CS.2.3:	Explain the process of arranging or sorting information into useful order as well as the purpose for doing so.
SC.35.CS-CS.2.7:	Identify and correct logical errors in algorithms; written, mapped, live action, or digital.
SC.35.CS-CS.2.8:	Systematically test and identify logical errors in algorithms.
SC.35.CS-CS.2.9:	Explain how to correct logical errors in algorithms; written, mapped, live action, or digital.
SC.35.CS-CS.3.1:	Manipulate and publish multimedia artifacts using digital tools (local and online).
SC.35.CS-CS.3.2:	Create an artifact (independently and collaboratively) that answers a research question clearly communicating thoughts and ideas.
SC.35.CS-PC.3.2:	Gather, organize, and analyze information from digital resources.
SC.35.CS-PC.3.3:	Compare digital resources for accuracy, relevancy, and appropriateness.
SC.4.E.6.1:	Identify the three categories of rocks: igneous, (formed from molten rock); sedimentary (pieces of other rocks and fossilized organisms); and metamorphic (formed from heat and pressure).
SC.4.E.6.2:	Identify the physical properties of common earth-forming minerals, including hardness, color, luster, cleavage, and streak color, and recognize the role of minerals in the formation of rocks.
SC.4.E.6.3:	Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable.
SC.4.E.6.4:	Describe the basic differences between physical weathering (breaking down of rock by wind, water, ice, temperature change, and plants) and erosion (movement of rock by gravity, wind, water, and ice).
SC.4.E.6.5:	Investigate how technology and tools help to extend the ability of humans to observe very small things and very large things.
SC.4.E.6.6:	Identify resources available in Florida (water, phosphate, oil, limestone, silicon, wind, and solar energy).
SC.4.L.16.4:	Compare and contrast the major stages in the life cycles of Florida plants and animals, such as those that undergo incomplete and complete metamorphosis, and flowering and nonflowering seed-bearing plants.
SC.4.L.17.2:	Explain that animals, including humans, cannot make their own food and that when animals eat plants or other animals, the energy stored in the food source is passed to them.
SC.4.L.17.3:	Trace the flow of energy from the Sun as it is transferred along the food chain through the producers to the consumers.
SC.4.N.1.1:	Raise questions about the natural world, use appropriate reference materials that support understanding to obtain information (identifying the source), conduct both individual and team investigations through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.
SC.4.N.1.2:	Compare the observations made by different groups using multiple tools and seek reasons to explain the differences across groups.
SC.4.N.1.3:	Explain that science does not always follow a rigidly defined method ("the scientific method") but that science does involve the use of observations and empirical evidence.
SC.4.N.1.4:	Attempt reasonable answers to scientific questions and cite evidence in support.
SC.4.N.1.5:	Compare the methods and results of investigations done by other classmates.
SC.4.N.1.6:	Keep records that describe observations made, carefully distinguishing actual observations from ideas and inferences about the observations.
SC.4.N.1.7:	Recognize and explain that scientists base their explanations on evidence.
SC.4.N.1.8:	Recognize that science involves creativity in designing experiments.
SC.4.P.8.1:	Measure and compare objects and materials based on their physical properties including: mass, shape, volume, color, hardness, texture, odor, taste, attraction to magnets
SC.4.P.8.2:	Identify properties and common uses of water in each of its states.
SC.4.P.8.3:	Explore the Law of Conservation of Mass by demonstrating that the mass of a whole object is always the same as the sum of the masses of its parts
SC.4.P.8.4:	Investigate and describe that magnets can attract magnetic materials and attract and repel other magnets.
SC.4.P.9.1:	Identify some familiar changes in materials that result in other materials with different characteristics, such as decaying animal or plant matter, burning, rusting, and cooking.
SC.4.P.10.1:	Observe and describe some basic forms of energy, including light, heat, sound, electrical, and the energy of motion.

Sci 4.10.3.2 Immedigate and explain that sound is produced by vibrating objects and that pitch depends on how fast or slow the object vibrates. Sci 4.12.1: Recognize that an object in motion always changes its position and may change its direction. Sci 4.12.2: Investigate and describe that the speed of an object is determined by the distance it travels in a unit of time and that objects can move at different speeds. MAFS 4.0.1.2: Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize that transports and use to atopy, and identify right transples. MAFS 4.0.1.2: Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize infort figures and transplemes or absence of angles. MAFS 4.0.1.1: Recognize a line of symmetry for a two dimensional figure as a line across the figure such that the figures and transplemes and the second seco	SC.4.P.10.2:	Investigate and describe that energy has the ability to cause motion or create change.
Sci. 4.7.12.1: Recognize that an object in motion always changes its position and may change its direction. Sci. 4.7.12.2: Investigate and describe that the speed of an object is determined by the distance it travels in a unit of time and that objects can move at different speeds. MATS 4.6.1.1: Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two dimensional figures. MATS 4.6.1.2: Specified size. Recognize and that trippes as a category, and identify right triangles. MATS 4.6.1.3: Recognize all net of symmetry for a two-dimensional figures as the across the figure such that the figure can be tolded along the line into matching aparts. (Jointly line symmetric figures and draw lines of symmetry. MATS 4.MD.1.1: Know relative sizes of measurement, units within one system of units including km, m, cm, kg, gib, oz.1, in the rm, sin, see .Within a single system of measurement, equivalents in a two column table. For example, know that 1 ft is 12 lines as long as 1 in. Express the insplit of a 1 stake as 48 in. Generate a conversion table for feet and inches islang the number gains (1, 2), (2, 0, 3, 2). MATS 4.MD.1.2: Use the four operations to solve word problems ³ involving distances, intervals of time, and means of Linear and intervals of time. and means the problems knowing simple fractions or decimals. Perpendicular and the end island and intervals of time, and moneys, the acting the resound of the figure and short objects and starts and perineter formals for resounds of the analyticate resounds. The subset and the solution of the action and the soluto display data set of measurements in fractions of a	SC.4.P.10.3:	Investigate and explain that sound is produced by vibrating objects and that pitch depends on how fast or slow the object vibrates.
Sci 4.P.12.2. Investigate and describe that the speed of an object is determined by the distance it travels in a unit of time and that objects can move at different speeds. MAFS 4.G.1.1: Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular into, or the presence or absence of angles of a specified size. Recognize a line of symmetry for a two-dimensional figures as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetry. MAFS 4.G.1.2: Know relative sizes of measurement units within one system of units including km. m. m. kg. gp. lb. czi. I m. Ir, min, sec. Within a single system of measurement, texpress massurements in a larger unit In terms of a smaller unit. Record measurement equivalents in a two column table. For example, know that if its 12 times as long as 1 in. Express the length of a 4 snake as 48 in. Generate a conversion table for feet and inches tisting the number single. It is 20, 20, 20, 20, 20, 20, 20, 20, 20, 20,	SC.4.P.12.1:	Recognize that an object in motion always changes its position and may change its direction.
MAFS.4.6.1.1: Draw points, lines, line segments, rays, angles (right, acute, obtase), and perpendicular and parallel ines. Identify these in two-dimensional figures based on the presence or absence of parallel or perpendicular inlex, or the presence or absence of angles of a specified size. Recognize right friangles as a category, and identify right triangles. MAFS.4.6.1.2: Recognize right friangles as a category. and identify right triangles. MAFS.4.6.1.3: Recognize right friangles as a category. and identify right triangles. MAFS.4.6.1.3: Recognize right friangles as a category. and identify right triangles. MAFS.4.0.1.2: Category in the presence of angles of the argument intervation of units including km. mc. mk.g.g. (b, cz:1, ml: hr, min, sec. Within a single system of measurement, topress made right mines of a smaller on the Record measurement into two column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), Use the four operations to solve word problems' involving distances, intervats of time, and money, including problems involving simple fractions of distance and intervate of time using linear models. (See glossary Table 1 and Table 2) (Computational flueres? With fractions and decimate is not the goal for studened areal. MAFS.4.MD.1.2: Marke a line plot to display adata set of measurements in tractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length etheron.	SC.4.P.12.2:	Investigate and describe that the speed of an object is determined by the distance it travels in a unit of time and that objects can move at different speeds.
MAFS 4.G.1.2: Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry. MAFS 4.G.1.3: Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry. MAFS 4.MD.1.1: Renow relative sizes of measurements in a larger unit in terms of a smaller unit. Record measurement quivalents in a two-column table. For example, how that 1 th 1s 12 times as an any as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inchesis listing the number pairs (1, 12) (2, 24) (3, 36). MAFS 4.MD.1.2: Use the four operations to solve word problems ¹ involving distances, intervals of time, and money, including problems involving simple fractions or decimals ¹ . Represent fits of distance and linevals of the using linear models. (See glossary Table 1 and Table 2) (Computational fluency with fractions and decimals is not the goal for students at this grade level.) MAFS 4.MD.1.3: Apply the area of the longit, by viewing the area formula as a multiplication equation with an unknown factor. MAFS 4.MD.3.6: The area of the longit, by viewing the area formula as a multiplication equation with an unknown factor. MAFS 4.MD.3.6: The actimation presenteer line linop tots. For example, from a line plot find and inter	MAFS.4.G.1.1:	Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.
MAPS.4.G.1.3: Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetry. MAPS.4.M.D.1.1: Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetry. MAPS.4.M.D.1.1: Recognize a line of symmetry for a two-dimensional figure as a line across the figure of a waller unit. Rec2 in . General a conversion table for feet and inches listing the number pairs (1, 12), <i>D</i> , 240, (3, 30). MAPS.4.M.D.1.2: Use the four operations to solve word problems ¹ involving distances, intervals of time, and money. Including problems involving simple fractions or decimals ² , Represent fractional quantities of distance and intervals of time using linear models. (See glossary Table 1 and Table 2) (Computational fluency with fractions and decimals is not the goal for students at this grade level). MAPS.4.M.D.1.3: Apply the area and penimeter formulas for rectangels in real world and mathematical problems. For example, find the width of a rectangular room gloen the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor. MAPS.4.M.D.2.4: If ractions by using information presented in line plots. For example, find the width of a rectangular room gloen the area of the flooring and the length, by viewing the area dromula as a multiplication equation with an unknown factor. MAPS.4.M.D.3.5: Recognize angles. Segmetric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angl	MAFS.4.G.1.2:	Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.
MAFS.4.MD.1.1: Resourcent units within one system of units including km, mr; kg, gl, b, c2:1, mit, r, min, sec. Within a single system of measurements in a two-cultum table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 3) WaFS.4.MD.1.2: Use the four operations to solve word problems' involving distances, intervals of time, and money, including problems involving simple fractions or decimals? Represent fractional quantities of distance and intervals of time using linear models. ("See glossary Table 1 and Table 2) (#Computational fuency with fractions and decimals is not the goal for students at this grade level.) MAFS.4.MD.1.3: Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length. by viewing the area formula as a multiplication equation with an unknown factor. MAFS.4.MD.2.4: Makes a line plot to display adata set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimers in an insect collection. MAFS.4.MD.3.5: An angle is measuremented, within teference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. MAF	MAFS.4.G.1.3:	Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.
Use the four operations to solve word problems ¹ involving distances, intervals of time, and money, including problems involving simple fractions or decimals ² , Represent fractional quantities of distance and intervals of time using linear models. (See glossary Table 1 and Table 2) (Computational fluency with fractions and decimals is not the goal for students at this grade level.) MAFS 4.MD.1.3: Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor. MAFS 4.MD.2.4: Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection. MAFS 4.MD.3.5: Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:	MAFS.4.MD.1.1:	Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36),
 MAFS.4.MD.1.3: Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor. MAKS.4.MD.2.4: Factors by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimers in an insect collection. Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. b. An angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measure of she parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems. MAFS.4.MD.3.6: Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems no find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure. MAFS.4.MD.3.7: Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10	MAFS.4.MD.1.2:	Use the four operations to solve word problems ¹ involving distances, intervals of time, and money, including problems involving simple fractions or decimals ² . Represent fractional quantities of distance and intervals of time using linear models. (¹ See glossary Table 1 and Table 2) (² Computational fluency with fractions and decimals is not the goal for students at this grade level.)
Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection. MAFS.4.MD.2.4: Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. b. An angle that turns through <i>n</i> one-degree angles is said to have an angle measure of <i>n</i> degrees. MAFS.4.MD.3.6: Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. Recognize angle measure as deditive. When an angle is decomposed into ono-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure. MAFS.4.ND.3.7: Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100. MAFS.4.NF.3.6: Use decimal notation for fractions with denomina	MAFS.4.MD.1.3:	Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.
 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular are between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. b. An angle that turns through <i>n</i> one-degree angles is said to have an angle measure of <i>n</i> degrees. MAFS 4.MD.3.6: Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure. MAFS 4.ND.3.7: Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100. MAFS 4.NF.3.6: Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100: describe a length as 0.62 meters: locate 0.62 on a number line diagram. MAFS 4.NF.3.7: Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model. ELD.K12 ELL SC.1: English language learners communicate information, ideas and concepts necessary for academic	MAFS.4.MD.2.4:	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.
MAFS.4.MD.3.6:Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.MAFS.4.MD.3.6:Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.MAFS.4.MD.3.7:Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.MAFS.4.NF.3.5:Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.MAFS.4.NF.3.7:Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.	MAFS.4.MD.3.5:	 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. b. An angle that turns through <i>n</i> one-degree angles is said to have an angle measure of <i>n</i> degrees.
MAFS.4.MD.3.7:Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.MAFS.4.NF.3.5:Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.MAFS.4.NF.3.6:Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100: describe a length as 0.62 meters: locate 0.62 on a number line diagram.MAFS.4.NF.3.7:Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.	MAFS.4.MD.3.6:	Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.
MAFS.4.NF.3.5:Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.MAFS.4.NF.3.6:Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.MAFS.4.NF.3.7:Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.	MAFS.4.MD.3.7:	Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.
MAFS.4.NF.3.6: Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram. MAFS.4.NF.3.6: Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.	MAFS.4.NF.3.5:	Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.
Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.ELD.K12.ELL.SC.1:English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.	MAFS.4.NF.3.6:	Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.
ELD.K12.ELL.SC.1: English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.	MAFS.4.NF.3.7:	Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.
	ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.

VERSION DESCRIPTION

This course offers students an opportunity to deepen science, mathematics, engineering, and technology skills. The primary content focus will be to expand knowledge of current grade level standards in mathematics and science by applying that content in a real world, hands-on situation involving engineering and technology. For fourth grade, themes will focus on the investigation of number sense, measurement, geometry, earth science, life science, and physical science concepts.

Students will participate in various hands-on STEM activities in this supplemental course to assist in the mastery of current grade level mathematics and science standards.

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).

- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

English Language Development (ELD) Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English Language Learners (ELL) to communicate information, ideas and concepts for academic success in science and math. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

GENERAL INFORMATION

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades PreK to 5 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: STEM LAB 4 Course Length: Year (Y) Course Attributes: • Class Size Core Required

Course Status: Course Approved

Educator Certifications

Elementary Education (Elementary Grades 1-6) Elementary Education (Grades K-6)

STEM Lab Grade 4 (#5020110) 2022 - And Beyond

Course Standards

Name	Description
SC.35.CS-CC.1.1:	Identify technology tools for individual and collaborative data collection, writing, communication, and publishing activities.
SC 35 CS-CC 1 2·	Describe key ideas and details while working individually or collaboratively using digital tools and media-rich resources in a way that informs,
30.33.03-00.1.2.	persuades, and/or entertains.
SC.35.CS-CC.1.3:	Identify ways that technology can foster teamwork, and collaboration can support problem solving and innovation.
SC.35.CS-CC.1.5:	Explain that providing and receiving feedback from others can improve performance and outcomes for collaborative digital projects.
SC.35.CS-CP.1.2:	Identify and describe examples of databases from everyday life (e.g., library catalogs, school records, telephone directories, and contact lists).
SC.35.CS-CP.1.3:	Identify, research, and collect a data set on a topic, issue, problem, or question using age-appropriate technologies.
SC.35.CS-CP.1.4:	Collect, organize, graph, and analyze data to answer a question using a database or spreadsheet.
SC.35.CS-CP.2.1:	Perform keyboarding skills for communication and the input of data and information.
SC.35.CS-CP.2.2:	Create, test, and modify a program in a graphical environment (e.g., block-based visual programming language), individually and collaboratively.
SC.35.CS-CP.2.4:	Explain that programs need known initial conditions (e.g., set initial score to zero in a game, initialize variables, or initial values set by hardware input).
SC.35.CS-CP.2.5:	Detect and correct program errors, including those involving arithmetic operators, conditionals, and repetition, using interactive debugging.
SC.35.CS-CP.3.1:	Write, communicate and publish activities using technology tools.
SC.35.CS-CP.3.2:	Present digitally created products, either individually and collaboratively, where a topic, concept, or skill is carefully analyzed or thoughtfully explored.
SC.35.CS-CS.1.1:	Identify the concepts illustrated by a simulation (e.g., ecosystem, predator/prey, and invasive species).
SC.35.CS-CS.1.3:	Answer a question, individually and collaboratively, using data from a simulation.
SC.35.CS-CS.1.4:	Create a simple model of a system (e.g., flower or solar system) and explain what the model shows and does not show.
SC.35.CS-CS.2.1:	Solve age-appropriate problems using information organized using digital graphic organizers (e.g., concept maps and Venn-diagrams).
SC.35.CS-CS.2.3:	Explain the process of arranging or sorting information into useful order as well as the purpose for doing so.
SC.35.CS-CS.2.7:	Identify and correct logical errors in algorithms; written, mapped, live action, or digital.
SC.35.CS-CS.2.8:	Systematically test and identify logical errors in algorithms.
SC.35.CS-CS.2.9:	Explain how to correct logical errors in algorithms; written, mapped, live action, or digital.
SC.35.CS-CS.3.1:	Manipulate and publish multimedia artifacts using digital tools (local and online).
SC.35.CS-CS.3.2:	Create an artifact (independently and collaboratively) that answers a research question clearly communicating thoughts and ideas.
SC.35.CS-PC.3.2:	Gather, organize, and analyze information from digital resources.
SC.35.CS-PC.3.3:	Compare digital resources for accuracy, relevancy, and appropriateness.
SC.4.E.6.1:	Identify the three categories of rocks: igneous, (formed from molten rock); sedimentary (pieces of other rocks and fossilized organisms); and metamorphic (formed from heat and pressure).
SC.4.E.6.2:	Identify the physical properties of common earth-forming minerals, including hardness, color, luster, cleavage, and streak color, and recognize the role of minerals in the formation of rocks.
SC.4.E.6.3:	Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable.
SC.4.E.6.4:	Describe the basic differences between physical weathering (breaking down of rock by wind, water, ice, temperature change, and plants) and erosion (movement of rock by gravity, wind, water, and ice).
SC.4.E.6.5:	Investigate how technology and tools help to extend the ability of humans to observe very small things and very large things.
SC.4.E.6.6:	Identify resources available in Florida (water, phosphate, oil, limestone, silicon, wind, and solar energy).
SC.4.L.16.4:	Compare and contrast the major stages in the life cycles of Florida plants and animals, such as those that undergo incomplete and complete metamorphosis, and flowering and nonflowering seed-bearing plants.
SC.4.L.17.2:	Explain that animals, including humans, cannot make their own food and that when animals eat plants or other animals, the energy stored in the food source is passed to them.
SC.4.L.17.3:	Trace the flow of energy from the Sun as it is transferred along the food chain through the producers to the consumers.
SC.4.N.1.1:	Raise questions about the natural world, use appropriate reference materials that support understanding to obtain information (identifying the source), conduct both individual and team investigations through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.
SC.4.N.1.2:	Compare the observations made by different groups using multiple tools and seek reasons to explain the differences across groups.
SC.4.N.1.3:	Explain that science does not always follow a rigidly defined method ("the scientific method") but that science does involve the use of observations and empirical evidence.
SC.4.N.1.4:	Attempt reasonable answers to scientific questions and cite evidence in support.
SC.4.N.1.5:	Compare the methods and results of investigations done by other classmates.
SC.4.N.1.6:	Keep records that describe observations made, carefully distinguishing actual observations from ideas and inferences about the observations.
SC.4.N.1.7:	Recognize and explain that scientists base their explanations on evidence.
SC.4.N.1.8:	Recognize that science involves creativity in designing experiments.
SC.4.P.8.1:	Measure and compare objects and materials based on their physical properties including: mass, shape, volume, color, hardness, texture, odor, taste, attraction to magnets
SC.4.P.8.2:	Identify properties and common uses of water in each of its states.
SC.4.P.8.3:	Explore the Law of Conservation of Mass by demonstrating that the mass of a whole object is always the same as the sum of the masses of its parts
SC.4.P.8.4:	Investigate and describe that magnets can attract magnetic materials and attract and renel other magnets
SC.4.P.9.1:	Identify some familiar changes in materials that result in other materials with different characteristics, such as decaying animal or plant matter,
SC 4 P 10 1	Observe and describe some basic forms of energy including light, heat, sound, electrical, and the energy of motion
30.4.1.10.1.	observe and describe some basic forms of energy, melduling light, near, sound, electrical, and the energy of motion.

SC.4.P.10.2:	Investigate and describe that energy has the ability to cause motion or create change.	
SC.4.P.10.3:	Investigate and explain that sound is produced by vibrating objects and that pitch depends on how fast or slow the object vibrates.	
SC.4.P.12.1:	Recognize that an object in motion always changes its position and may change its direction.	
SC.4.P.12.2:	Investigate and describe that the speed of an object is determined by the distance it travels in a unit of time and that objects can move at different speeds	
MA.K12.MTR.1.1:	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach. Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' effort when solving challenging problems. Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. 	
	Progress from modeling problems with objects and drawings to using algorithms and equations.	
	Express connections between concepts and representations. Choose a representation based on the given context or purpose	
	Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses.	
	Show students that various representations can have different purposes and can be useful in different situations.	
MA.K12.MTR.3.1:	 Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.	
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. 	
	 Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers. 	
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts.	
MA K12 MTR 5 1	Look for similarities among problems.	
WA.KTZ.WHK.0.1:	Connect solutions of problems to more complicated large-scale situations.	
	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:	

	 Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.

VERSION DESCRIPTION

This course offers students an opportunity to deepen science, mathematics, engineering, and technology skills. The primary content focus will be to expand knowledge of current grade level standards in mathematics and science by applying that content in a real world, hands-on situation involving engineering and technology. For fourth grade, themes will focus on the investigation of number sense, measurement, geometry, earth science, life science, and physical science concepts.

Students will participate in various hands-on STEM activities in this supplemental course to assist in the mastery of current grade level mathematics and science standards.

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- · Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

English Language Development (ELD) Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English Language Learners (ELL) to communicate information, ideas and concepts for academic success in science and math. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

GENERAL INFORMATION	
Course Number: 5020110	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades PreK to 5 Education Courses > Subject: Science > SubSubject: General Sciences >
	Abbreviated Title: STEM LAB 4
	Course Length: Year (Y)
	Course Attributes:
	Class Size Core Required
Course Status: State Board Approved	

Educator Certifications

Elementary Education (Elementary Grades 1-6)	
Elementary Education (Grades K-6)	

STEM Lab Grade 5 (#5020120) 2016 - 2022 (current)

Course Standards

Name	Description
SC.35.CS-CC.1.1:	Identify technology tools for individual and collaborative data collection, writing, communication, and publishing activities.
SC.35.CS-CC.1.2:	Describe key ideas and details while working individually or collaboratively using digital tools and media-rich resources in a way that informs, persuades, and/or entertains.
SC.35.CS-CC.1.3:	Identify ways that technology can foster teamwork, and collaboration can support problem solving and innovation.
SC.35.CS-CC.1.5:	Explain that providing and receiving feedback from others can improve performance and outcomes for collaborative digital projects.
SC.35.CS-CP.1.2:	Identify and describe examples of databases from everyday life (e.g., library catalogs, school records, telephone directories, and contact lists).
SC.35.CS-CP.1.3:	Identify, research, and collect a data set on a topic, issue, problem, or question using age-appropriate technologies.
SC.35.CS-CP.1.4:	Collect, organize, graph, and analyze data to answer a question using a database or spreadsheet.
SC.35.CS-CP.2.1:	Perform keyboarding skills for communication and the input of data and information.
SC.35.CS-CP.2.2:	Create, test, and modify a program in a graphical environment (e.g., block-based visual programming language), individually and collaboratively.
SC.35.CS-CP.2.4:	Explain that programs need known initial conditions (e.g., set initial score to zero in a game, initialize variables, or initial values set by hardware input).
SC.35.CS-CP.2.5:	Detect and correct program errors, including those involving arithmetic operators, conditionals, and repetition, using interactive debugging.
SC.35.CS-CS.1.1:	Identify the concepts illustrated by a simulation (e.g., ecosystem, predator/prey, and invasive species).
SC.35.CS-CS.1.3:	Answer a question, individually and collaboratively, using data from a simulation.
SC.35.CS-CS.2.1:	Solve age-appropriate problems using information organized using digital graphic organizers (e.g., concept maps and Venn-diagrams).
SC.35.CS-CS.2.3:	Explain the process of arranging or sorting information into useful order as well as the purpose for doing so.
SC.35.CS-CS.2.5:	Explain that there are several possible algorithms for searching within a dataset (such as finding a specific word in a word list or card in a deck of cards).
SC.35.CS-CS.2.6:	Write an algorithm to solve a grade-level appropriate problem (e.g., move a character through a maze, instruct a character to draw a specific shape, have a character start, repeat or end activity as required or upon a specific event), individually or collaboratively.
SC.35.CS-CS.2.7:	Identify and correct logical errors in algorithms; written, mapped, live action, or digital.
SC.35.CS-CS.2.8:	Systematically test and identify logical errors in algorithms.
SC.35.CS-CS.2.9:	Explain how to correct logical errors in algorithms; written, mapped, live action, or digital.
SC.35.CS-CS.3.1:	Manipulate and publish multimedia artifacts using digital tools (local and online).
SC.35.CS-CS.3.2:	Create an artifact (independently and collaboratively) that answers a research question clearly communicating thoughts and ideas.
SC.35.CS-CS.6.2:	Compare and contrast human and computer performance on similar tasks (e.g., sorting alphabetically or finding a path across a cluttered room) to understand which is best suited to the task
SC.5.N.1.1:	Define a problem, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types such as: systematic observations, experiments requiring the identification of variables, collecting and organizing data, interpreting data in
	charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.5.N.1.2:	Explain the difference between an experiment and other types of scientific investigation.
SC.5.N.1.3:	Recognize and explain the need for repeated experimental trials.
SC.5.N.1.4:	Identify a control group and explain its importance in an experiment.
SC.5.N.1.5:	Recognize and explain that authentic scientific investigation frequently does not parallel the steps of "the scientific method."
SC.5.N.1.6:	Recognize and explain the difference between personal opinion/interpretation and verified observation.
SC.5.P.8.1:	Compare and contrast the basic properties of solids, liquids, and gases, such as mass, volume, color, texture, and temperature.
SC.5.P.8.2:	Investigate and identify materials that will dissolve in water and those that will not and identify the conditions that will speed up or slow down the dissolving process.
SC.5.P.8.3:	Demonstrate and explain that mixtures of solids can be separated based on observable properties of their parts such as particle size, shape, color, and magnetic attraction.
SC.5.P.8.4:	Explore the scientific theory of atoms (also called atomic theory) by recognizing that all matter is composed of parts that are too small to be seen without magnification.
SC.5.P.9.1:	Investigate and describe that many physical and chemical changes are affected by temperature.
SC.5.P.10.1:	Investigate and describe some basic forms of energy, including light, heat, sound, electrical, chemical, and mechanical.
SC.5.P.10.2:	Investigate and explain that energy has the ability to cause motion or create change.
SC.5.P.10.3:	Investigate and explain that an electrically-charged object can attract an uncharged object and can either attract or repel another charged object without any contact between the objects.
SC.5.P.10.4:	Investigate and explain that electrical energy can be transformed into heat, light, and sound energy, as well as the energy of motion.
SC.5.P.11.1:	Investigate and illustrate the fact that the flow of electricity requires a closed circuit (a complete loop).
SC.5.P.11.2:	Identify and classify materials that conduct electricity and materials that do not.
SC.5.P.13.1:	Identify familiar forces that cause objects to move, such as pushes or pulls, including gravity acting on falling objects.
SC.5.P.13.2:	Investigate and describe that the greater the force applied to it, the greater the change in motion of a given object.
SC.5.P.13.3:	Investigate and describe that the more mass an object has, the less effect a given force will have on the object's motion.
SC.5.P.13.4:	Investigate and explain that when a force is applied to an object but it does not move, it is because another opposing force is being applied by something in the environment so that the forces are balanced.
	Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that
MAFS.5.G.1.1:	the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis)

	and y-coordinate).
MAFS.5.G.1.2:	Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.
MAFS.5.MD.1.1:	Convert among different-sized standard measurement units (i.e., km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec) within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.
MAFS.5.MD.2.2:	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.
MAFS.5.MD.3.3:	Recognize volume as an attribute of solid figures and understand concepts of volume measurement. a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume. b. A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.
MAFS.5.MD.3.4:	Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.
	Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.
MAFS.5.MD.3.5:	 a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication. b. Apply the formulas V = I × w × h and V = B × h for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems. c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.
	Clarifications: Examples of Opportunities for In-Depth Focus Students work with volume as an attribute of a solid figure and as a measurement quantity. Students also relate volume to multiplication and addition. This work begins a progression leading to valuable skills in geometric measurement in middle school.
MAFS.5.NF.1.1:	Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. For example, $2/3 + 5/4 = 8/12 + 15/12 = 23/12$. (In general, $a/b + c/d = (ad + bc)/bd$.)
	using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. For example, recognize an incorrect result $2/5 + 1/2 = 3/7$, by observing that $3/7 < 1/2$.
MAFS.5.NF.1.2:	Clarifications: Examples of Opportunities for In-Depth Focus
	When students meet this standard, they bring together the threads of fraction equivalence (grades 3–5) and addition and subtraction (grades K– 4) to fully extend addition and subtraction to fractions.
MAFS.5.NF.2.3:	Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.

VERSION DESCRIPTION

This course offers students an opportunity to deepen science, mathematics, engineering, and technology skills. The primary content focus will be to expand knowledge of current grade level standards in mathematics and science by applying that content in a real world, hands-on situation involving engineering and technology. For fifth grade, themes will focus on the investigation of number sense, measurement, geometry, and physical science concepts.

Students will participate in various hands-on STEM activities in this supplemental course to assist in the mastery of current grade level mathematics and science standards.

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.

- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

English Language Development (ELD) Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English Language Learners (ELL) to communicate information, ideas and concepts for academic success in science and math. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

GENERAL INFORMATION		
Course Number: 5020120	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades PreK to 5 Education Courses > Subject: Science > SubSubject: General Sciences >	
	Abbreviated Title: STEM LAB 5	
	Course Length: Year (Y)	
	Course Attributes:	
	Class Size Core Required	
Course Status: Course Approved		

Educator Certifications

Elementary Education (Elementary Grades 1-6) Elementary Education (Grades K-6)

STEM Lab Grade 5 (#5020120) 2022 - And Beyond

Course Standards

Name	Description
SC.35.CS-CC.1.1:	Identify technology tools for individual and collaborative data collection, writing, communication, and publishing activities.
SC 35 CS CC 1 2·	Describe key ideas and details while working individually or collaboratively using digital tools and media-rich resources in a way that informs,
56.55.65-66.1.2.	persuades, and/or entertains.
SC.35.CS-CC.1.3:	Identify ways that technology can foster teamwork, and collaboration can support problem solving and innovation.
SC.35.CS-CC.1.5:	Explain that providing and receiving feedback from others can improve performance and outcomes for collaborative digital projects.
SC.35.CS-CP.1.2:	Identify and describe examples of databases from everyday life (e.g., library catalogs, school records, telephone directories, and contact lists).
SC.35.CS-CP.1.3:	Identify, research, and collect a data set on a topic, issue, problem, or question using age-appropriate technologies.
SC.35.CS-CP.1.4:	Collect, organize, graph, and analyze data to answer a question using a database or spreadsheet.
SC.35.CS-CP.2.1:	Perform keyboarding skills for communication and the input of data and information.
SC.35.CS-CP.2.2:	Create, test, and modify a program in a graphical environment (e.g., block-based visual programming language), individually and collaboratively.
SC.35.CS-CP.2.4:	Explain that programs need known initial conditions (e.g., set initial score to zero in a game, initialize variables, or initial values set by hardware input).
SC.35.CS-CP.2.5:	Detect and correct program errors, including those involving arithmetic operators, conditionals, and repetition, using interactive debugging.
SC.35.CS-CS.1.1:	Identify the concepts illustrated by a simulation (e.g., ecosystem, predator/prey, and invasive species).
SC.35.CS-CS.1.3:	Answer a question, individually and collaboratively, using data from a simulation.
SC.35.CS-CS.2.1:	Solve age-appropriate problems using information organized using digital graphic organizers (e.g., concept maps and Venn-diagrams).
SC.35.CS-CS.2.3:	Explain the process of arranging or sorting information into useful order as well as the purpose for doing so.
SC.35.CS-CS.2.5:	Explain that there are several possible algorithms for searching within a dataset (such as finding a specific word in a word list or card in a deck of cards).
SC.35.CS-CS.2.6:	Write an algorithm to solve a grade-level appropriate problem (e.g., move a character through a maze, instruct a character to draw a specific shape, have a character start, repeat or end activity as required or upon a specific event), individually or collaboratively.
SC.35.CS-CS.2.7:	Identify and correct logical errors in algorithms; written, mapped, live action, or digital.
SC.35.CS-CS.2.8:	Systematically test and identify logical errors in algorithms.
SC.35.CS-CS.2.9:	Explain how to correct logical errors in algorithms; written, mapped, live action, or digital.
SC.35.CS-CS.3.1:	Manipulate and publish multimedia artifacts using digital tools (local and online).
SC.35.CS-CS.3.2:	Create an artifact (independently and collaboratively) that answers a research question clearly communicating thoughts and ideas.
	Compare and contrast human and computer performance on similar tasks (e.g., sorting alphabetically or finding a path across a cluttered room) to
50.35.05-05.0.2:	understand which is best suited to the task.
SC.5.N.1.1:	Define a problem, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types such as: systematic observations, experiments requiring the identification of variables, collecting and organizing data, interpreting data in charts, tables, and graphics, and graphics, and defined conclusions.
SC F N 1 2	chaits, tables, and graphics, analyze finormation, make predictions, and derend conclusions.
SC.5.N.1.2.	Explain the difference between an experiment and other types of sciencinc investigation.
SC 5 N 1 4	Identify a control group and explain its importance in an experiment
SC 5 N 1 5	Decoming a control group and explain its importance in an experiment.
SC 5 N 1 6	Recognize and explain that additional scientific investigation requerity does not parallel the steps of the scientific method.
SC 5 P 8 1	Compare and contrast the basic properties of solids, liquids, and pases such as mass volume color, texture, and temperature
56.5.1.0.1.	compare and contrast the basic properties of solids, inquids, and gases, such as mass, volume, color, texture, and temperature.
SC.5.P.8.2:	dissolving process.
SC.5.P.8.3:	and magnetic attraction.
SC.5.P.8.4:	Explore the scientific theory of atoms (also called atomic theory) by recognizing that all matter is composed of parts that are too small to be seen without magnification.
SC.5.P.9.1:	Investigate and describe that many physical and chemical changes are affected by temperature.
SC.5.P.10.1:	Investigate and describe some basic forms of energy, including light, heat, sound, electrical, chemical, and mechanical.
SC.5.P.10.2:	Investigate and explain that energy has the ability to cause motion or create change.
SC.5.P.10.3:	Investigate and explain that an electrically-charged object can attract an uncharged object and can either attract or repel another charged object without any contact between the objects.
SC.5.P.10.4:	Investigate and explain that electrical energy can be transformed into heat, light, and sound energy, as well as the energy of motion.
SC.5.P.11.1:	Investigate and illustrate the fact that the flow of electricity requires a closed circuit (a complete loop).
SC.5.P.11.2:	Identify and classify materials that conduct electricity and materials that do not.
SC.5.P.13.1:	Identify familiar forces that cause objects to move, such as pushes or pulls, including gravity acting on falling objects.
SC.5.P.13.2:	Investigate and describe that the greater the force applied to it, the greater the change in motion of a given object.
SC.5.P.13.3:	Investigate and describe that the more mass an object has, the less effect a given force will have on the object's motion.
SC.5.P.13.4:	Investigate and explain that when a force is applied to an object but it does not move, it is because another opposing force is being applied by something in the environment so that the forces are balanced.
	Mathematicians who participate in effortful learning both individually and with others:
	Analyze the problem in a way that makes sense given the task.
	Ask questions that will help with solving the task.
	 Build perseverance by modifying methods as needed while solving a challenging task.

	 Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach.
MA.K12.MTR.1.1:	Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	 Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	 Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts. Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense.

MA K12 MTR 6 1	 Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
	Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation.
	Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
	 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.

VERSION DESCRIPTION

This course offers students an opportunity to deepen science, mathematics, engineering, and technology skills. The primary content focus will be to expand knowledge of current grade level standards in mathematics and science by applying that content in a real world, hands-on situation involving engineering and technology. For fifth grade, themes will focus on the investigation of number sense, measurement, geometry, and physical science concepts.

Students will participate in various hands-on STEM activities in this supplemental course to assist in the mastery of current grade level mathematics and science standards.

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

• Asking questions (for science) and defining problems (for engineering).

- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

English Language Development (ELD) Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English Language Learners (ELL) to communicate information, ideas and concepts for academic success in science and math. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 5020120	Courses > Grade Group: Grades PreK to 5 Education
Course Number: 5020120	Courses > Subject: Science > SubSubject: General
	Sciences >
	Abbreviated Title: STEM LAB 5
	Course Length: Year (Y)
	Course Attributes:
	Class Size Core Required
Course Status: State Board Approved	

Educator Certifications

Elementary Education (Elementary Grades 1-6)	
Elementary Education (Grades K-6)	

M/J Life Science (#2000010) 2015 - 2022 (current)

Course Standards

Use grade appropriate Nature of Science benchmarks (i.e. if this course is offered to sixth grade students, then the SC.6.N benchmarks should be integrated into the sixth grade course, and SC.7.N and SC.8.N benchmarks should be omitted from the sixth grade course).

Name	Description
SC.6.L.14.1:	Describe and identify patterns in the hierarchical organization of organisms from atoms to molecules and cells to tissues to organs to organ systems to organisms.
SC.6.L.14.2:	Investigate and explain the components of the scientific theory of cells (cell theory): all organisms are composed of cells (single-celled or multi- cellular), all cells come from pre-existing cells, and cells are the basic unit of life.
SC.6.L.14.3:	Recognize and explore how cells of all organisms undergo similar processes to maintain homeostasis, including extracting energy from food, getting rid of waste, and reproducing.
SC.6.L.14.4:	Compare and contrast the structure and function of major organelles of plant and animal cells, including cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles.
SC.6.L.14.5:	Identify and investigate the general functions of the major systems of the human body (digestive, respiratory, circulatory, reproductive, excretory, immune, nervous, and musculoskeletal) and describe ways these systems interact with each other to maintain homeostasis.
SC.6.L.14.6:	Compare and contrast types of infectious agents that may infect the human body, including viruses, bacteria, fungi, and parasites.
SC.6.L.15.1:	Analyze and describe how and why organisms are classified according to shared characteristics with emphasis on the Linnaean system combined with the concept of Domains.
SC.6.N.1.1:	Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.6.N.1.2:	Explain why scientific investigations should be replicable.
SC.6.N.1.3:	Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.
SC.6.N.1.4:	Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.
SC.6.N.1.5:	Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.
SC.6.N.2.1:	Distinguish science from other activities involving thought.
SC.6.N.2.2:	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.
SC.6.N.2.3:	Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals.
SC.6.N.3.1:	Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.
SC.6.N.3.2:	Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.
SC.6.N.3.3:	Give several examples of scientific laws.
SC.6.N.3.4:	Identify the role of models in the context of the sixth grade science benchmarks.
SC.7.L.15.1:	Recognize that fossil evidence is consistent with the scientific theory of evolution that living things evolved from earlier species.
SC.7.L.15.2:	Explore the scientific theory of evolution by recognizing and explaining ways in which genetic variation and environmental factors contribute to evolution by natural selection and diversity of organisms.
SC.7.L.15.3:	Explore the scientific theory of evolution by relating how the inability of a species to adapt within a changing environment may contribute to the extinction of that species.
SC.7.L.16.1:	Understand and explain that every organism requires a set of instructions that specifies its traits, that this hereditary information (DNA) contains genes located in the chromosomes of each cell, and that heredity is the passage of these instructions from one generation to another.
SC.7.L.16.2:	Determine the probabilities for genotype and phenotype combinations using Punnett Squares and pedigrees.
SC.7.L.16.3:	Compare and contrast the general processes of sexual reproduction requiring meiosis and asexual reproduction requiring mitosis.
SC.7.L.16.4:	Recognize and explore the impact of biotechnology (cloning, genetic engineering, artificial selection) on the individual, society and the environment.
SC.7.L.17.1:	Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.
SC.7.L.17.2:	Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism.
SC.7.L.17.3:	Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.
SC.7.N.1.1:	Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.7.N.1.2:	Differentiate replication (by others) from repetition (multiple trials).
SC.7.N.1.3:	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.
SC.7.N.1.4:	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.
SC.7.N.1.5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.
SC.7.N.1.6:	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.
SC.7.N.1.7:	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.
SC.7.N.2.1:	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.
SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.

SC.7.N.3.2:	Identify the benefits and limitations of the use of scientific models.
SC.8.L.18.1:	Describe and investigate the process of photosynthesis, such as the roles of light, carbon dioxide, water and chlorophyll; production of food; release of oxygen.
SC.8.L.18.2:	Describe and investigate how cellular respiration breaks down food to provide energy and releases carbon dioxide.
SC.8.L.18.3:	Construct a scientific model of the carbon cycle to show how matter and energy are continuously transferred within and between organisms and their physical environment.
SC.8.L.18.4:	Cite evidence that living systems follow the Laws of Conservation of Mass and Energy.
SC.8.N.1.1:	Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.8.N.1.2:	Design and conduct a study using repeated trials and replication.
SC.8.N.1.3:	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.
SC.8.N.1.4:	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.
SC.8.N.1.6:	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
SC.8.N.2.1:	Distinguish between scientific and pseudoscientific ideas.
SC.8.N.2.2:	Discuss what characterizes science and its methods.
SC 8 N 3 2	Explain why theories may be modified but are rarely discarded
SC.8.N.4.1:	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.
SC.8.N.4.2:	Explain how political, social, and economic concerns can affect science, and vice versa.
LAFS 6 SL 1 2 [.]	Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or
EAI 5.0.3E.1.2.	issue under study.
LAFS.6.SL.1.3: LAFS.6.SL.2.4:	Delineate a speaker's argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not. Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.
LAFS.6.SL.2.5:	Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.
LAFS.68.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts.
LAFS.68.RST.1.2:	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
LAFS.68.RST.1.3:	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LAFS.68.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.
LAFS.68.RST.2.5:	Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.
LAFS.68.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
LAFS.68.RST.3.7:	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LAFS.68.RST.3.8:	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
LAFS.68.RST.3.9:	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
LAFS.68.WHST.1.1:	 write arguments focused on <i>alscipline-specific content</i>. a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.
	d. Establish and maintain a formal style.
	e. Provide a concluding statement or section that follows from and supports the argument presented.
LAFS.68.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples. c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to inform about or explain the topic. e. Establish and maintain a formal style and objective tone. f. Provide a concluding statement or section that follows from and supports the information or explanation presented.
LAFS.68.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.68.WHST.2.5:	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
LAFS.68.WHST.2.6:	Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.
LAFS.68.WHST.3.7:	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
LAFS.68.WHST.3.8:	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
LAFS.68.WHST.3.9:	Draw evidence from informational texts to support analysis reflection, and research.
LAFS.68.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

MAFS.6.EE.3.9:	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. <i>For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.</i>
MAFS.6.SP.2.4:	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
MAFS.6.SP.2.5:	 Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting Reason abstractly and quantitatively
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments communicate to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful

MAFS.K12.MP.6.1:	about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
	Examine the likelihood of injury or illness if engaging in unhealthy/risky behaviors.
HE.6.C.1.8:	Clarifications: Obesity related to poor nutrition and inactivity, cancer and chronic lung disease related to tobacco use, injuries caused from failure to use seat restraint, and sexually transmitted diseases caused by sexual activity.
	Analyze how environmental factors affect personal health.
HE.7.C.1.3:	Clarifications: Food refrigeration, appropriate home heating and cooling, air/water quality, and garbage/trash collection.
	Describe how heredity can affect personal health.
HE.7.C.1.7:	Clarifications: Sickle-cell anemia, diabetes, and acne.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).

- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Course Number : 2000010	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: Biological Sciences >	
	Abbreviated Title: M/J LIF SCI	
	Course Length: Year (Y)	
	Course Attributes:	
	Class Size Core Required	
	Course Level: 2	
Course Status: Course Approved		
Grade Level(s): 6,7,8		

Educator Certifications

Science (Secondary Grades 7-12)
Middle Grades Integrated Curriculum (Middle Grades 5-9)
Middle Grades General Science (Middle Grades 5-9)
Biology (Grades 6-12)

M/J Life Science (#2000010) 2022 - And Beyond

Course Standards

Use grade appropriate Nature of Science benchmarks (i.e. if this course is offered to sixth grade students, then the SC.6.N benchmarks should be integrated into the sixth grade course, and SC.7.N and SC.8.N benchmarks should be omitted from the sixth grade course).

Name	Description
SC.6.L.14.1:	Describe and identify patterns in the hierarchical organization of organisms from atoms to molecules and cells to tissues to organs to organ systems to organisms.
SC.6.L.14.2:	Investigate and explain the components of the scientific theory of cells (cell theory): all organisms are composed of cells (single-celled or multi- cellular), all cells come from pre-existing cells, and cells are the basic unit of life.
SC.6.L.14.3:	Recognize and explore how cells of all organisms undergo similar processes to maintain homeostasis, including extracting energy from food, getting rid of waste, and reproducing.
SC.6.L.14.4:	Compare and contrast the structure and function of major organelles of plant and animal cells, including cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles.
SC.6.L.14.5:	Identify and investigate the general functions of the major systems of the human body (digestive, respiratory, circulatory, reproductive, excretory, immune, nervous, and musculoskeletal) and describe ways these systems interact with each other to maintain homeostasis.
SC.6.L.14.6:	Compare and contrast types of infectious agents that may infect the human body, including viruses, bacteria, fungi, and parasites.
SC.6.L.15.1:	Analyze and describe how and why organisms are classified according to shared characteristics with emphasis on the Linnaean system combined with the concept of Domains.
SC.6.N.1.1:	Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.6.N.1.2:	Explain why scientific investigations should be replicable.
SC.6.N.1.3:	Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.
SC.6.N.1.4:	Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.
SC.6.N.1.5:	Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.
SC.6.N.2.1:	Distinguish science from other activities involving thought.
SC.6.N.2.2:	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.
SC.6.N.2.3:	Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals.
SC.6.N.3.1:	Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.
SC.6.N.3.2:	Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.
SC.6.N.3.3:	Give several examples of scientific laws.
SC.6.N.3.4:	Identify the role of models in the context of the sixth grade science benchmarks.
SC.7.L.15.1:	Recognize that fossil evidence is consistent with the scientific theory of evolution that living things evolved from earlier species.
SC.7.L.15.2:	Explore the scientific theory of evolution by recognizing and explaining ways in which genetic variation and environmental factors contribute to evolution by natural selection and diversity of organisms.
SC.7.L.15.3:	Explore the scientific theory of evolution by relating how the inability of a species to adapt within a changing environment may contribute to the extinction of that species.
SC.7.L.16.1:	Understand and explain that every organism requires a set of instructions that specifies its traits, that this hereditary information (DNA) contains genes located in the chromosomes of each cell, and that heredity is the passage of these instructions from one generation to another.
SC.7.L.16.2:	Determine the probabilities for genotype and phenotype combinations using Punnett Squares and pedigrees.
SC.7.L.16.3:	Compare and contrast the general processes of sexual reproduction requiring meiosis and asexual reproduction requiring mitosis.
SC.7.L.16.4:	Recognize and explore the impact of biotechnology (cloning, genetic engineering, artificial selection) on the individual, society and the environment.
SC.7.L.17.1:	Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.
SC.7.L.17.2:	Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism.
SC.7.L.17.3:	Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.
SC.7.N.1.1:	Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.7.N.1.2:	Differentiate replication (by others) from repetition (multiple trials).
SC.7.N.1.3:	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.
SC.7.N.1.4:	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.
SC.7.N.1.5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.
SC.7.N.1.6:	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.
SC.7.N.1.7:	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.
SC.7.N.2.1:	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.
SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.

SC.7.N.3.2:	Identify the benefits and limitations of the use of scientific models.
SC.8.L.18.1:	Describe and investigate the process of photosynthesis, such as the roles of light, carbon dioxide, water and chlorophyll; production of food; release of oxygen.
SC.8.L.18.2:	Describe and investigate how cellular respiration breaks down food to provide energy and releases carbon dioxide.
SC.8.L.18.3:	Construct a scientific model of the carbon cycle to show how matter and energy are continuously transferred within and between organisms and the physical environment.
SC.8.L.18.4:	Cite evidence that living systems follow the Laws of Conservation of Mass and Energy.
SC.8.N.1.1:	Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts tables and graphics analyze information, make predictions and defend conclusions.
SC.8.N.1.2:	Design and conduct a study using repeated trials and replication.
SC.8.N.1.3:	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.
SC.8.N.1.4:	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.
SC.8.N.1.6:	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
SC.8.N.2.1:	Distinguish between scientific and pseudoscientific ideas.
SC.8.N.2.2:	Discuss what characterizes science and its methods.
SC.8.N.3.1:	Select models useful in relating the results of their own investigations.
SC.8.N.3.2:	Explain why theories may be modified but are rarely discarded.
SC.8.N.4.1:	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.
SC.8.N.4.2:	Explain how political, social, and economic concerns can affect science, and vice versa.
	Mathematicians who participate in effortful learning both individually and with others:
	Analyze the problem in a way that makes sense given the task.
	Ask questions that will help with solving the task.
	Build perseverance by modifying methods as needed while solving a challenging task.
	 Stay engaged and maintain a positive mindset when working to solve tasks.
	Help and support each other when attempting a new method or approach.
MA.K12.MTR.1.1:	Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve.
	Recognize students' effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:
MA K12 MTD 2.1.	 Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose.
	Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:
	Help students make connections between concepts and representations.
	Provide opportunities for students to use manipulatives when investigating concepts.
	Guide students from concrete to pictorial to abstract representations as understanding progresses.
	• Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:
	Solast afficient and appropriate methods for solving problems within the given context
	Maintain flexibility and accuracy while performing procedures and mental calculations
	Complete tasks accurately and with confidence
	Adapt procedures to apply them to a new context
MA.K12.MTR.3.1:	Ise feedback to improve efficiency when performing calculations
	• Use recuback to improve emetericly when performing calculations.
	Clarifications:
	Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately
	 Provide students with the nexibility to solve problems by selecting a procedure that allows then to solve enciently and accurately. Offer multiple opportunities for students to practice efficient and appendizable methods.
	Orier multiple opportunities for students to practice enclent and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	 Provide opportunities for students to reject on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
	Communicate mathematical ideas, vocabulary and methods effectively.
	Analyze the mathematical thinking of others.
	Compare the efficiency of a method to those expressed by others.
	Recognize errors and suggest how to correctly solve the task.
	Justify results by explaining methods and processes.
MA.K12.MTR.4.1:	Construct possible arguments based on evidence.
1	

	 Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:
	 Help students to use patterns and structure to help understand and connect mathematical concepts. Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context.
	 Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
	 Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4 5 Students continue with previous skills and reference comments made by speakers and pager. Students cita texts that they're directly.
	 quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.

	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing.
	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
	Examine the likelihood of injury or illness if engaging in unhealthy/risky behaviors.
HE.6.C.1.8:	Clarifications: Obesity related to poor nutrition and inactivity, cancer and chronic lung disease related to tobacco use, injuries caused from failure to use seat restraint, and sexually transmitted diseases caused by sexual activity.
HE.7.C.1.3:	Analyze how environmental factors affect personal health.
	Clarifications: Food refrigeration, appropriate home heating and cooling, air/water quality, and garbage/trash collection.
	Describe how heredity can affect personal health.
HE.7.C.1.7:	Clarifications: Sickle-cell anemia, diabetes, and acne.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- · Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

English Language Development ELD Standards

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success The ELD standard should

specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

GENERAL INFORMATION

Course	Number:	2000010
000.00		20000.0

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: Biological Sciences > Abbreviated Title: M/J LIF SCI Course Length: Year (Y) Course Attributes: • Class Size Core Required Course Level: 2

Course Status: State Board Approved Grade Level(s): 6,7,8

Educator Certifications

Science (Secondary Grades 7-12) Middle Grades Integrated Curriculum (Middle Grades 5-9) Middle Grades General Science (Middle Grades 5-9) Biology (Grades 6-12)

M/J Life Science, Advanced (#2000020) 2015 - 2022 (current)

Course Standards

Use grade appropriate Nature of Science benchmarks (i.e. if this course is offered to seventh grade students, then the SC.7.N benchmarks should be integrated into the seventh grade course, and SC.6.N and SC.8.N benchmarks should be omitted from the seventh grade course).

Name	Description
SC.6.L.14.1:	Describe and identify patterns in the hierarchical organization of organisms from atoms to molecules and cells to tissues to organs to organ systems to organisms.
SC.6.L.14.2:	Investigate and explain the components of the scientific theory of cells (cell theory): all organisms are composed of cells (single-celled or multi- cellular), all cells come from pre-existing cells, and cells are the basic unit of life.
SC.6.L.14.3:	Recognize and explore how cells of all organisms undergo similar processes to maintain homeostasis, including extracting energy from food, getting rid of waste, and reproducing.
SC.6.L.14.4:	Compare and contrast the structure and function of major organelles of plant and animal cells, including cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles.
SC.6.L.14.5:	Identify and investigate the general functions of the major systems of the human body (digestive, respiratory, circulatory, reproductive, excretory, immune, nervous, and musculoskeletal) and describe ways these systems interact with each other to maintain homeostasis.
SC.6.L.14.6:	Compare and contrast types of infectious agents that may infect the human body, including viruses, bacteria, fungi, and parasites.
SC.6.L.15.1:	Analyze and describe how and why organisms are classified according to shared characteristics with emphasis on the Linnaean system combined with the concept of Domains.
SC.6.N.1.1:	Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.6.N.1.2:	Explain why scientific investigations should be replicable.
SC.6.N.1.3:	Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.
SC.6.N.1.4:	Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.
SC.6.N.1.5:	Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.
SC.6.N.2.1:	Distinguish science from other activities involving thought.
SC.6.N.2.2:	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.
SC.6.N.2.3:	Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals.
SC.6.N.3.1:	Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.
SC.6.N.3.2:	Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.
SC.6.N.3.3:	Give several examples of scientific laws.
SC.6.N.3.4:	Identify the role of models in the context of the sixth grade science benchmarks.
SC.7.L.15.1:	Recognize that fossil evidence is consistent with the scientific theory of evolution that living things evolved from earlier species.
SC.7.L.15.2:	Explore the scientific theory of evolution by recognizing and explaining ways in which genetic variation and environmental factors contribute to evolution by natural selection and diversity of organisms.
SC.7.L.15.3:	Explore the scientific theory of evolution by relating how the inability of a species to adapt within a changing environment may contribute to the extinction of that species.
SC.7.L.16.1:	Understand and explain that every organism requires a set of instructions that specifies its traits, that this hereditary information (DNA) contains genes located in the chromosomes of each cell, and that heredity is the passage of these instructions from one generation to another.
SC.7.L.16.2:	Determine the probabilities for genotype and phenotype combinations using Punnett Squares and pedigrees.
SC.7.L.16.3:	Compare and contrast the general processes of sexual reproduction requiring meiosis and asexual reproduction requiring mitosis.
SC.7.L.16.4:	Recognize and explore the impact of biotechnology (cloning, genetic engineering, artificial selection) on the individual, society and the environment.
SC.7.L.17.1:	Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.
SC.7.L.17.2:	Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism.
SC.7.L.17.3:	Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.
SC.7.N.1.1:	Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.7.N.1.2:	Differentiate replication (by others) from repetition (multiple trials).
SC.7.N.1.3:	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.
SC.7.N.1.4:	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.
SC.7.N.1.5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.
SC.7.N.1.6:	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.
SC.7.N.1.7:	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.
SC.7.N.2.1:	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.
SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.

SC.7.N.3.2:	Identify the benefits and limitations of the use of scientific models.
SC.8.L.18.1:	Describe and investigate the process of photosynthesis, such as the roles of light, carbon dioxide, water and chlorophyll; production of food; release of oxygen.
SC.8.L.18.2:	Describe and investigate how cellular respiration breaks down food to provide energy and releases carbon dioxide.
SC.8.L.18.3:	Construct a scientific model of the carbon cycle to show how matter and energy are continuously transferred within and between organisms and their physical environment.
SC.8.L.18.4:	Cite evidence that living systems follow the Laws of Conservation of Mass and Energy.
SC.8.N.1.1:	Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.8.N.1.2:	Design and conduct a study using repeated trials and replication.
SC.8.N.1.3:	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.
SC.8.N.1.4:	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.
SC.8.N.1.6:	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
SC.8.N.2.1:	Distinguish between scientific and pseudoscientific ideas.
SC.8.N.2.2:	Discuss what characterizes science and its methods.
SC 8 N 3 2	Select models useful in relating the results of their own investigations.
SC 8 N 4 1	Explain why theories may be mouned but are rarely discarded.
SC.8.N.4.2:	Explain that solvice is one of the processes that can be ded to inform decision making at the commany, state, heading, and international revers.
SC.912.L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).
SC.912.L.14.3:	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.16.14:	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.
SC.912.L.16.16:	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.
SC.912.L.17.6:	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.
LAFS.00.R31.1.1.	Determine the central ideas or conclusions of a text: provide an accurate summary of the text distinct from prior knowledge or opinions
LAFS 68 RST 1.3	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks
LAFS.68.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.
LAFS.68.RST.2.5:	Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.
LAFS.68.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
LAFS.68.RST.3.7:	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LAFS.68.RST.3.8:	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
LAFS.68.RST.3.9:	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
LAFS.68.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports the argument presented.
LAFS.68.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples. c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to inform about or explain the topic. e. Establish and maintain a formal style and objective tone. f. Provide a concluding statement or section that follows from and supports the information or explanation presented.

LAFS.68.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.68.WHST.2.5:	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
LAFS.68.WHST.2.6:	Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.
LAFS.68.WHST.3.7:	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
LAFS.68.WHST.3.8:	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
LAFS.68.WHST.3.9:	Draw evidence from informational texts to support analysis reflection, and research.
LAFS.68.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
LAFS.7.SL.1.2:	Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.
LAFS.7.SL.1.3:	Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.
LAFS.7.SL.2.4:	Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.
LAFS.7.SL.2.5:	Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.
MAFS.6.EE.3.9:	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. <i>For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.</i>
MAFS.6.SP.2.4:	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
	Summarize numerical data sets in relation to their context, such as by:
	a. Reporting the number of observations.
MAFS.6.SP.2.5:	 Describing the nature of the attribute under investigation, including now it was measured and its units of measurement. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation) as well as
	describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered
	d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.
	Lise measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two
MAFS.7.SP.2.4:	populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a
	fourth-grade science book.
MAFS.7.SP.3.5:	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
	Construct viable arguments and critique the reasoning of others.
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting
	iviodel with mathematics.

н

MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose. Standard Relation to Course: Supporting
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
	Examine the likelihood of injury or illness if engaging in unhealthy/risky behaviors.
HE.6.C.1.8:	Clarifications: Obesity related to poor nutrition and inactivity, cancer and chronic lung disease related to tobacco use, injuries caused from failure to use seat restraint, and sexually transmitted diseases caused by sexual activity.
	Analyze how environmental factors affect personal health.
HE.7.C.1.3:	Clarifications: Food refrigeration, appropriate home heating and cooling, air/water quality, and garbage/trash collection.
	Describe how heredity can affect personal health.
HE.7.C.1.7:	Clarifications: Sickle-cell anemia, diabetes, and acne.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National

Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The course also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGl/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Course Number: 2000020

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: Biological Sciences > Abbreviated Title: M/J LIF SCI ADV Course Length: Year (Y) Course Attributes: • Class Size Core Required Course Level: 3

Course Status: Course Approved

Grade Level(s): 6,7,8

Educator Certifications

Science (Secondary Grades 7-12) Middle Grades Integrated Curriculum (Middle Grades 5-9) Middle Grades General Science (Middle Grades 5-9) Biology (Grades 6-12)

M/J Life Science, Advanced (#2000020) 2022 - And Beyond

Course Standards

Use grade appropriate Nature of Science benchmarks (i.e. if this course is offered to seventh grade students, then the SC.7.N benchmarks should be integrated into the seventh grade course, and SC.6.N and SC.8.N benchmarks should be omitted from the seventh grade course).

Name	Description
SC.6.L.14.1:	Describe and identify patterns in the hierarchical organization of organisms from atoms to molecules and cells to tissues to organs to organ systems to organisms.
SC.6.L.14.2:	Investigate and explain the components of the scientific theory of cells (cell theory): all organisms are composed of cells (single-celled or multi- cellular), all cells come from pre-existing cells, and cells are the basic unit of life.
SC.6.L.14.3:	Recognize and explore how cells of all organisms undergo similar processes to maintain homeostasis, including extracting energy from food, getting rid of waste, and reproducing.
SC.6.L.14.4:	Compare and contrast the structure and function of major organelles of plant and animal cells, including cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles.
SC.6.L.14.5:	Identify and investigate the general functions of the major systems of the human body (digestive, respiratory, circulatory, reproductive, excretory, immune, nervous, and musculoskeletal) and describe ways these systems interact with each other to maintain homeostasis.
SC.6.L.14.6:	Compare and contrast types of infectious agents that may infect the human body, including viruses, bacteria, fungi, and parasites.
SC.6.L.15.1:	Analyze and describe how and why organisms are classified according to shared characteristics with emphasis on the Linnaean system combined with the concept of Domains.
SC.6.N.1.1:	Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.6.N.1.2:	Explain why scientific investigations should be replicable.
SC.6.N.1.3:	Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.
SC.6.N.1.4:	Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.
SC.6.N.1.5:	Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.
SC.6.N.2.1:	Distinguish science from other activities involving thought.
SC.6.N.2.2:	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.
SC.6.N.2.3:	Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals.
SC.6.N.3.1:	Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.
SC.6.N.3.2:	Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.
SC.6.N.3.3:	Give several examples of scientific laws.
SC.6.N.3.4:	Identify the role of models in the context of the sixth grade science benchmarks.
SC.7.L.15.1:	Recognize that fossil evidence is consistent with the scientific theory of evolution that living things evolved from earlier species.
SC.7.L.15.2:	Explore the scientific theory of evolution by recognizing and explaining ways in which genetic variation and environmental factors contribute to evolution by natural selection and diversity of organisms.
SC.7.L.15.3:	Explore the scientific theory of evolution by relating how the inability of a species to adapt within a changing environment may contribute to the extinction of that species.
SC.7.L.16.1:	Understand and explain that every organism requires a set of instructions that specifies its traits, that this hereditary information (DNA) contains genes located in the chromosomes of each cell, and that heredity is the passage of these instructions from one generation to another.
SC.7.L.16.2:	Determine the probabilities for genotype and phenotype combinations using Punnett Squares and pedigrees.
SC.7.L.16.3:	Compare and contrast the general processes of sexual reproduction requiring meiosis and asexual reproduction requiring mitosis.
SC.7.L.16.4:	Recognize and explore the impact of biotechnology (cloning, genetic engineering, artificial selection) on the individual, society and the environment.
SC.7.L.17.1:	Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.
SC.7.L.17.2:	Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism.
SC.7.L.17.3:	Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.
SC.7.N.1.1:	Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.7.N.1.2:	Differentiate replication (by others) from repetition (multiple trials).
SC.7.N.1.3:	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.
SC.7.N.1.4:	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.
SC.7.N.1.5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.
SC.7.N.1.6:	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.
SC.7.N.1.7:	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.
SC.7.N.2.1:	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.
SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.

SC.7.N.3.2:	Identify the benefits and limitations of the use of scientific models.
SC.8.L.18.1:	Describe and investigate the process of photosynthesis, such as the roles of light, carbon dioxide, water and chlorophyll; production of food; release of oxygen.
SC.8.L.18.2:	Describe and investigate how cellular respiration breaks down food to provide energy and releases carbon dioxide.
SC.8.L.18.3:	Construct a scientific model of the carbon cycle to show how matter and energy are continuously transferred within and between organisms and their physical environment.
SC.8.L.18.4:	Cite evidence that living systems follow the Laws of Conservation of Mass and Energy.
SC.8.N.1.1:	Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.8.N.1.2:	Design and conduct a study using repeated trials and replication.
SC.8.N.1.3:	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.
SC.8.N.1.4:	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.
SC.8.N.1.6:	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
SC 8 N 2 2	Discuss what characterizes science and its methods
SC.8.N.3.1:	Select models useful in relating the results of their own investigations.
SC.8.N.3.2:	Explain why theories may be modified but are rarely discarded.
SC.8.N.4.1:	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.
SC.8.N.4.2:	Explain how political, social, and economic concerns can affect science, and vice versa.
SC 912 14 2	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and
SC 912 14 3	active transport). Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic
30.712.E.14.3.	cells.
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms. Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which
SC.912.L.15.13:	result in differential reproductive success.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.16.14:	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.
SC.912.L.16.16:	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.
SC.912.L.17.6:	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
50.772.E.10.71	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach.
MA.K12.MTR.1.1:	 Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:
MA.K12.MTR.2.1:	 Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Grovide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses.
	Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:

MA.K12.MTR.3.1:	 Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context.
	Use feedback to improve efficiency when performing calculations.
	 Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details

	from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
	Examine the likelihood of injury or illness if engaging in unhealthy/risky behaviors.
HE.6.C.1.8:	Clarifications: Obesity related to poor nutrition and inactivity, cancer and chronic lung disease related to tobacco use, injuries caused from failure to use seat restraint, and sexually transmitted diseases caused by sexual activity.
	Analyze how environmental factors affect personal health.
HE.7.C.1.3:	Clarifications: Food refrigeration, appropriate home heating and cooling, air/water quality, and garbage/trash collection.
HE.7.C.1.7:	Describe how heredity can affect personal health.
	Clarifications: Sickle-cell anemia, diabetes, and acne.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.
Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- · Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

English Language Development ELD Standards

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number 2000020	Courses > Grade Group: Grades 6 to 8 Education
Course Number: 2000020	Courses > Subject: Science > SubSubject: Biologica
	Sciences >
	Abbreviated Title: M/J LIF SCI ADV
	Course Length: Year (Y)
	Course Attributes:
	Class Size Core Required
	Course Level: 3
Course Status: State Board Approved	
Grade Level(s): 6,7,8	

Educator Certifications

Science (Secondary Grades 7-12)
Middle Grades Integrated Curriculum (Middle Grades 5-9)
Middle Grades General Science (Middle Grades 5-9)
Biology (Grades 6-12)

M/J STEM Life Science (#2000025) 2015 - 2022 (current)

Course Standards

Name	Description
SC.6.N.1.2:	Explain why scientific investigations should be replicable.
SC.6.N.1.3:	Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.
SC.6.N.1.4:	Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.
SC.6.N.1.5:	Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.
SC.6.N.2.1:	Distinguish science from other activities involving thought.
SC.6.N.2.2:	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.
	Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests,
SC.6.N.2.3:	and goals.
SC.6.N.3.1:	Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.
SC.6.N.3.2:	Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.
SC.6.N.3.3:	Give several examples of scientific laws.
SC.6.N.3.4:	Identify the role of models in the context of the sixth grade science benchmarks.
SC.7.L.15.1:	Recognize that fossil evidence is consistent with the scientific theory of evolution that living things evolved from earlier species.
SC.7.L.15.2:	Explore the scientific theory of evolution by recognizing and explaining ways in which genetic variation and environmental factors contribute to evolution by natural selection and diversity of organisms.
SC.7.L.15.3:	Explore the scientific theory of evolution by relating how the inability of a species to adapt within a changing environment may contribute to the extinction of that species.
SC.7.L.16.1:	Understand and explain that every organism requires a set of instructions that specifies its traits, that this hereditary information (DNA) contains genes located in the chromosomes of each cell, and that heredity is the passage of these instructions from one generation to another.
SC.7.N.1.2:	Differentiate replication (by others) from repetition (multiple trials).
SC.7.N.1.3:	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.
SC.7.N.1.4:	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.
SC.7.N.1.5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.
SC.7.N.1.6:	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.
SC.7.N.1.7:	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.
SC.7.N.2.1:	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.
SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.
SC.7.N.3.2:	Identify the benefits and limitations of the use of scientific models.
SC.8.L.18.2:	Describe and investigate how cellular respiration breaks down food to provide energy and releases carbon dioxide.
SC.8.L.18.3:	Construct a scientific model of the carbon cycle to show how matter and energy are continuously transferred within and between organisms and their physical environment.
SC.8.L.18.4:	Cite evidence that living systems follow the Laws of Conservation of Mass and Energy.
SC.8.N.1.2:	Design and conduct a study using repeated trials and replication.
SC.8.N.1.3:	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.
SC.8.N.1.4:	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.
SC.8.N.1.6:	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
SC.8.N.2.1:	Distinguish between scientific and pseudoscientific ideas.
SC.8.N.2.2:	Discuss what characterizes science and its methods.
SC.8.N.3.1:	Select models useful in relating the results of their own investigations.
SC.8.N.3.2:	Explain why theories may be modified but are rarely discarded.
SC.8.N.4.1:	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.
MAFS.6.SP.1.1:	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.
MAFS.6.SP.1.2:	Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
MAFS.6.SP.1.3:	Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.
MAFS.6.SP.2.4:	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
	Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations.
	b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
MAFS.6.SP.2.5:	c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as

	describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.
MAFS.8.SP.1.2:	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.
MAFS.K12.MP.1.1:	Make sense of problems and persevere in solving them. Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Construct viable arguments and critique the reasoning of others.
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Model with mathematics.
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	Attend to precision. Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Look for and express regularity in repeated reasoning.

MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.68.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports the argument presented.
LAFS.68.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples. c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to inform about or explain the topic. e. Establish and maintain a formal style and objective tone. f. Provide a concluding statement or section that follows from and supports the information or explanation presented.
LAFS.68.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.68.WHST.2.5:	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
LAFS.68.WHST.2.6:	Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.
LAFS.68.WHST.3.7:	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
LAFS.68.WHST.3.8:	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
LAFS.68.WHST.3.9:	Draw evidence from informational texts to support analysis reflection, and research.
LAFS.68.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
HE.6.C.1.8:	Examine the likelihood of injury or illness if engaging in unhealthy/risky behaviors. Clarifications: Obesity related to poor nutrition and inactivity, cancer and chronic lung disease related to tobacco use, injuries caused from failure to use seat
1	restraint, and sexually transmitted diseases caused by sexual activity.
	restraint, and sexually transmitted diseases caused by sexual activity. Analyze how environmental factors affect personal health.
HE.7.C.1.3:	restraint, and sexually transmitted diseases caused by sexual activity. Analyze how environmental factors affect personal health. Clarifications: Food refrigeration, appropriate home heating and cooling, air/water quality, and garbage/trash collection.
HE.7.C.1.3:	restraint, and sexually transmitted diseases caused by sexual activity. Analyze how environmental factors affect personal health. Clarifications: Food refrigeration, appropriate home heating and cooling, air/water quality, and garbage/trash collection. Describe how heredity can affect personal health.
HE.7.C.1.3: HE.7.C.1.7:	restraint, and sexually transmitted diseases caused by sexual activity. Analyze how environmental factors affect personal health. Clarifications: Food refrigeration, appropriate home heating and cooling, air/water quality, and garbage/trash collection. Describe how heredity can affect personal health. Clarifications: Sickle-cell anemia, diabetes, and acne.

GENERAL NOTES

I

If this course is to be used in a STEM sequence in place of either the comprehensive or subject specific course sequences, teachers should refer to the test item specifications for the 8th grade SSA for information on tested standards which can be found at: https://www.fldoe.org/core/fileparse.php/5663/urlt/swsatisG8.pdf.

This course is an integrated Science, Technology, Engineering and Mathematics (STEM) course for middle school students. M/J STEM Life Science includes an integration of standards from science, mathematics, and english language arts (ELA) through the application to STEM problem solving using life science knowledge and science and engineering practices. Life science through applications such as biotechnology and biomedical engineering, are emphasized in this course. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Т

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- $\label{eq:constraint} \textbf{4. Emphasizing students supporting answers based upon evidence from the text.}$
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

ISTE Standards (http://www.iste.org/docs/pdfs/20-14_ISTE_Standards-S_PDF.pdf) should be incorporated in many contexts throughout the course.

Engineering Practices are emphasized in the course

http://www.nextgenscience.org/sites/ngss/files/Appendix%20F%20%20Science%20 and%20Engineering%20Practices%20 in%20 the%20NGSS%20-%20FINAL%20060513.pdf

Course Standards

NOTE: Use grade appropriate Nature of Science and mathematics content benchmarks (i.e. if this course is offered to seventh grade students, then the SC.7.N benchmarks should be integrated into the course content, and SC.6.N and SC.8.N benchmarks should be omitted from the seventh grade course).

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The course also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

GENERAL INFORMATION

Course Number: 2000025

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: Biological Sciences > Abbreviated Title: M/J STEM LIFE SCI Course Length: Year (Y) Course Attributes: • Class Size Core Required Course Level: 2

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 6,7,8

Educator Certifications Earth/Space Science (Grades 6-12)

Chemistry (Grades 6-12) Physics (Grades 6-12) Middle Grades General Science (Middle Grades 5-9) Biology (Grades 6-12)

M/J STEM Life Science (#2000025) 2022 - And Beyond

Course Standards

Name	Description
SC.6.N.1.2:	Explain why scientific investigations should be replicable.
SC.6.N.1.3:	Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.
SC.6.N.1.4:	Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.
SC.6.N.1.5:	Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.
SC.6.N.2.1:	Distinguish science from other activities involving thought.
SC.6.N.2.2:	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.
66 (N 2 2	Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests,
SC.6.N.2.3:	and goals.
SC.6.N.3.1:	Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.
SC.6.N.3.2:	Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.
SC.6.N.3.3:	Give several examples of scientific laws.
SC.6.N.3.4:	Identify the role of models in the context of the sixth grade science benchmarks.
SC.7.L.15.1:	Recognize that fossil evidence is consistent with the scientific theory of evolution that living things evolved from earlier species.
SC.7.L.15.2:	Explore the scientific theory of evolution by recognizing and explaining ways in which genetic variation and environmental factors contribute to evolution by natural selection and diversity of organisms.
SC.7.L.15.3:	Explore the scientific theory of evolution by relating how the inability of a species to adapt within a changing environment may contribute to the extinction of that species.
SC.7.L.16.1:	Understand and explain that every organism requires a set of instructions that specifies its traits, that this hereditary information (DNA) contains genes located in the chromosomes of each cell, and that heredity is the passage of these instructions from one generation to another.
SC.7.N.1.2:	Differentiate replication (by others) from repetition (multiple trials).
SC.7.N.1.3:	explain that not all scientific knowledge is derived from experimentation.
SC.7.N.1.4:	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.
SC.7.N.1.5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.
SC.7.N.1.6:	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.
SC.7.N.1.7:	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.
SC.7.N.2.1:	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.
SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.
SC.7.N.3.2:	Identify the benefits and limitations of the use of scientific models.
SC.8.L.18.2:	Describe and investigate how cellular respiration breaks down food to provide energy and releases carbon dioxide.
SC.8.L.18.3:	Construct a scientific model of the carbon cycle to show how matter and energy are continuously transferred within and between organisms and their physical environment.
SC.8.L.18.4:	Cite evidence that living systems follow the Laws of Conservation of Mass and Energy.
SC.8.N.1.2:	Design and conduct a study using repeated trials and replication.
SC.8.N.1.3:	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.
SC.8.N.1.4:	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.
	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of
SC.8.N.1.6:	imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
SC.8.N.2.1:	Distinguish between scientific and pseudoscientific ideas.
SC.8.N.2.2:	Discuss what characterizes science and its methods.
SC.8.N.3.1:	Select models useful in relating the results of their own investigations.
SC.8.N.3.2:	Explain why theories may be modified but are rarely discarded.
SC.8.N.4.1:	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.
	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks.
	Help and support each other when attempting a new method or approach.
MA.K12.MTR.1.1:	Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners.
	 Poster perseverance in students by choosing tasks that are challenging. Develop students' ability to apply the apply the school of the school of
	Develop students ability to analyze and problem solve. Recognize students' effort when solving challenging problems.

MA.K12.MTR.2.1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose.
	 Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations.
	 Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence.
	 Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task.

	• Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts:
	Connect mathematical concents to everyday experiences
	Use models and methods to understand, represent and solve problems.
	 Perform investigations to gather data or determine if a method is appropriate. Redesign models and methods to improve accuracy or
	efficiency.
	Clarifications:
	Provide opportunities for students to create models, both concrete and abstract, and perform investigations
	 Challenge students to question the accuracy of their models and methods.
	 Support students as they validate conclusions by comparing them to the given situation.
	 Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	Clarifications:
	K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing
	2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In
	3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly
	quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
	Clarifications:
ELA.K12.EE.3.1:	Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
	Clarifications:
	In kindergarten, students learn to listen to one another respectfully.
ELA.K12.EE.4.1:	collaborative conversations are becoming academic conversations.
	In grades 2.12, students ongage in academic conversations discussing claims and justifying their reasoning, refining and applying skills
	Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications:
	must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to
	do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing.
	Clarifications:
	In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends
	Examine the likelihood of injury or illness if angaging in unbealthy/risky behaviors
HE.6.C.1.8:	Clarifications:
	Obesity related to poor nutrition and inactivity, cancer and chronic lung disease related to tobacco use, injuries caused from failure to use seat restraint, and sexually transmitted diseases caused by sexual activity.
	Analyze how environmental factors affect personal health.
HE.7.C.1.3:	Clarifications: Food refrigeration, appropriate home heating and cooling, air/water quality, and garbage/trash collection.
	Describe how heredity can affect personal health.
HE.7.C.1.7:	Clarifications:
	Sickle-cell anemia, diabetes, and acne.
FLD K12 FLL SC 1	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science

GENERAL NOTES

If this course is to be used in a STEM sequence in place of either the comprehensive or subject specific course sequences, teachers should refer to the test item specifications for the 8th grade SSA for information on tested standards which can be found at: https://www.fldoe.org/core/fileparse.php/5663/urlt/swsatisG8.pdf.

This course is an integrated Science, Technology, Engineering and Mathematics (STEM) course for middle school students. M/J STEM Life Science includes an integration of standards from science, mathematics, and english language arts (ELA) through the application to STEM problem solving using life science knowledge and science and engineering practices. Life science through applications such as biotechnology and biomedical engineering, are emphasized in this course. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.
- ISTE Standards (http://www.iste.org/docs/pdfs/20-14_ISTE_Standards-S_PDF.pdf) should be incorporated in many contexts throughout the course.

Engineering Practices are emphasized in the course

http://www.nextgenscience.org/sites/ngss/files/Appendix%20F%20%20Science%20and%20Engineering%20Practices%20in%20the%20NGSS%20-%20FINAL%20060513.pdf

Course Standards

NOTE: Use grade appropriate Nature of Science and mathematics content benchmarks (i.e. if this course is offered to seventh grade students, then the SC.7.N benchmarks should be integrated into the course content, and SC.6.N and SC.8.N benchmarks should be omitted from the seventh grade course).

English Language Development ELD Standards

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

GENERAL INFORMATION

Course Number: 2000025

Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): 6,7,8 Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: Biological Sciences > Abbreviated Title: M/J STEM LIFE SCI Course Length: Year (Y) Course Attributes: • Class Size Core Required Course Level: 2

Educator Certifications

Earth/Space Science (Grades 6-12)

Chemistry (Grades 6-12)

Physics (Grades 6-12) Middle Grades General Science (Middle Grades 5-9)

Biology (Grades 6-12)

Middle Grades Integrated Curriculum (Middle Grades 5-9)

M/J International Baccalaureate MYP Life Science (#2000030) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at: http://www.ibo.org/en/programmes/

GENERAL INFORMATION

Course Number: 2000030

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 6,7,8 Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: Biological Sciences > Abbreviated Title: M/J IB MYP LIFE SCI Course Length: Year (Y) Course Attributes: • International Baccalaureate (IB) Course Level: 3

Educator Certifications

Science (Secondary Grades 7-12) Middle Grades Integrated Curriculum (Middle Grades 5-9) Middle Grades General Science (Middle Grades 5-9) Biology (Grades 6-12)

M/J International Baccalaureate MYP Biology (#2000050) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at: http://www.ibo.org/en/programmes/

GENERAL INFORMATION

Course Number: 2000050

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 6,7,8 Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: Biological Sciences > Abbreviated Title: M/J IB MYP BIOLOGY Course Length: Year (Y) Course Attributes: • International Baccalaureate (IB) Course Level: 3

Educator Certifications

Middle Grades General Science (Middle Grades 5-9) Biology (Grades 6-12) Middle Grades Integrated Curriculum (Middle Grades 5-9) Science (Secondary Grades 7-12)

M/J Science Transfer (#2000220) 2015 - 2022 (current)

Course Standards

Name	Description
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

GENERAL NOTES

SUBJECT AREA TRANSFER NUMBERS

Each course transferred into a Florida public school by an out-of-state or non-public school student should be matched with a course title and number when such course provides substantially the same content. However, a few transfer courses may not be close enough in content to be matched. For those courses a subject area transfer number is provided.

GENERAL INFORMATION

Course Number: 2000220

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: Physical Sciences > Abbreviated Title: M/J SCI TRAN Course Length: Not Applicable

Course Type: Transfer Course Course Status: Course Approved Grade Level(s): 6,7,8

M/J Science Transfer (#2000220) 2022 - And Beyond

Course Standards

Name	Description
MA.K12.MTR.1.1:	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach.
	 Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose.
	 Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1: MA.K12.MTR.4.1:	 Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations.
	 Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence.
	 Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts.

MA.K12.MTR.5.1:	 Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations.
	 Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
	Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
	 Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to

	do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

SUBJECT AREA TRANSFER NUMBERS

Each course transferred into a Florida public school by an out-of-state or non-public school student should be matched with a course title and number when such course provides substantially the same content. However, a few transfer courses may not be close enough in content to be matched. For those courses a subject area transfer number is provided.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

GENERAL INFORMATION

Course Number: 2000220

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: Physical Sciences > Abbreviated Title: M/J SCI TRAN Course Length: Not Applicable

Course Type: Transfer Course Course Status: State Board Approved Grade Level(s): 6,7,8

M/J Earth/Space Science (#2001010) 2015 - 2022 (current)

Course Standards

Use grade appropriate Nature of Science benchmarks (i.e. if this course is offered to seventh grade students, then the SC.7.N benchmarks should be integrated into the course content, and SC.6.N and SC.8.N benchmarks should be omitted from the seventh grade course).

Name	Description
SC.6.E.6.1:	Describe and give examples of ways in which Earth's surface is built up and torn down by physical and chemical weathering, erosion, and deposition.
SC.6.E.6.2:	Recognize that there are a variety of different landforms on Earth's surface such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes and relate these landforms as they apply to Florida.
SC.6.E.7.1:	Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through Earth's system.
SC.6.E.7.2:	Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate.
SC.6.E.7.3:	Describe how global patterns such as the jet stream and ocean currents influence local weather in measurable terms such as temperature, air pressure, wind direction and speed, and humidity and precipitation.
SC.6.E.7.4:	Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere.
SC.6.E.7.5:	Explain how energy provided by the sun influences global patterns of atmospheric movement and the temperature differences between air, water, and land.
SC.6.E.7.6:	Differentiate between weather and climate.
SC.6.E.7.7:	Investigate how natural disasters have affected human life in Florida.
SC.6.E.7.8:	Describe ways human beings protect themselves from hazardous weather and sun exposure.
SC.6.E.7.9:	Describe how the composition and structure of the atmosphere protects life and insulates the planet.
SC.6.N.1.1:	Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.6.N.1.2:	Explain why scientific investigations should be replicable.
SC.6.N.1.3:	Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.
SC.6.N.1.4:	Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.
SC.6.N.1.5:	Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.
SC.6.N.2.1:	Distinguish science from other activities involving thought.
SC.6.N.2.2:	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.
SC.6.N.2.3:	Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals.
SC.6.N.3.1:	Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.
SC.6.N.3.2:	Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.
SC.6.N.3.3:	Give several examples of scientific laws.
SC.6.N.3.4:	Identify the role of models in the context of the sixth grade science benchmarks.
SC.7.E.6.1:	Describe the layers of the solid Earth, including the lithosphere, the hot convecting mantle, and the dense metallic liquid and solid cores.
SC.7.E.6.2:	Identify the patterns within the rock cycle and relate them to surface events (weathering and erosion) and sub-surface events (plate tectonics and mountain building).
SC.7.E.6.3:	Identify current methods for measuring the age of Earth and its parts, including the law of superposition and radioactive dating.
SC.7.E.6.4:	Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes.
SC.7.E.6.5:	Explore the scientific theory of plate tectonics by describing how the movement of Earth's crustal plates causes both slow and rapid changes in Earth's surface, including volcanic eruptions, earthquakes, and mountain building.
SC.7.E.6.6:	Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.
SC.7.E.6.7:	Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean basins.
SC.7.N.1.1:	Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.7.N.1.2:	Differentiate replication (by others) from repetition (multiple trials).
SC.7.N.1.3:	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.
SC.7.N.1.4:	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.
SC.7.N.1.5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.
SC.7.N.1.6:	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.
SC.7.N.1.7:	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.
SC.7.N.2.1:	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.
SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.
SC.7.N.3.2:	Identify the benefits and limitations of the use of scientific models.

SC.8.E.5.1:	Recognize that there are enormous distances between objects in space and apply our knowledge of light and space travel to understand this
SC.8.E.5.2:	Recognize that the universe contains many billions of galaxies and that each galaxy contains many billions of stars.
SC.8.E.5.3:	Distinguish the hierarchical relationships between planets and other astronomical bodies relative to solar system, galaxy, and universe, including distance, size, and composition.
SC.8.E.5.4:	Explore the Law of Universal Gravitation by explaining the role that gravity plays in the formation of planets, stars, and solar systems and in determining their motions.
SC.8.E.5.5:	Describe and classify specific physical properties of stars: apparent magnitude (brightness), temperature (color), size, and luminosity (absolute brightness).
SC.8.E.5.6:	Create models of solar properties including: rotation, structure of the Sun, convection, sunspots, solar flares, and prominences.
SC.8.E.5.7:	Compare and contrast the properties of objects in the Solar System including the Sun, planets, and moons to those of Earth, such as gravitational force, distance from the Sun, speed, movement, temperature, and atmospheric conditions.
SC.8.E.5.8:	Compare various historical models of the Solar System, including geocentric and heliocentric.
SC.8.E.5.9:	Explain the impact of objects in space on each other including:1. the Sun on the Earth including seasons and gravitational attraction2. the Moon on the Earth, including phases, tides, and eclipses, and the relative position of each body.
SC.8.E.5.10:	Assess how technology is essential to science for such purposes as access to outer space and other remote locations, sample collection, measurement, data collection and storage, computation, and communication of information.
SC.8.E.5.11:	Identify and compare characteristics of the electromagnetic spectrum such as wavelength, frequency, use, and hazards and recognize its application to an understanding of planetary images and satellite photographs.
SC.8.E.5.12:	Summarize the effects of space exploration on the economy and culture of Florida.
SC.8.N.1.1:	Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.8.N.1.2:	Design and conduct a study using repeated trials and replication.
SC.8.N.1.3:	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.
SC.8.N.1.4:	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.
SC.8.N.1.6:	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
SC.8.N.2.1:	Distinguish between scientific and pseudoscientific ideas.
SC.8.N.2.2:	Discuss what characterizes science and its methods.
SC.8.IV.3.1:	Explain why theories may be modified but are rarely discarded
SC.8.N.4.1:	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.
SC.8.N.4.2:	Explain how political, social, and economic concerns can affect science, and vice versa.
LAFS.6.SL.1.1:	 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. b. Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed. c. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion. d. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.
LAFS.6.SL.1.2:	Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.
LAFS.6.SL.1.3:	Delineate a speaker's argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.
LAFS.6.SL.2.4:	Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.
LAFS.6.SL.2.5:	Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.
LAFS.68.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts.
LAFS.68.RST.1.2:	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
LAFS.68.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and tonics.
LAFS.68.RST.2.5:	Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.
LAFS.68.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
LAFS.68.RST.3.7:	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LAFS.68.RST.3.8:	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
LAFS.68.RST.3.9:	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
LAFS.68.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.

	d. Establish and maintain a formal style.
	e. Provide a concluding statement or section that follows from and supports the argument presented.
LAFS.68.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples. c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.
	d. Use precise language and domain-specific vocabulary to inform about or explain the topic.
	e. Establish and maintain a formal style and objective tone.
	f. Provide a concluding statement or section that follows from and supports the information or explanation presented.
LAFS.68.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.68.WHST.2.5:	with some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
LAFS.68.WHST.2.6:	efficiently.
LAFS.68.WHST.3.7:	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
LAFS.68.WHST.3.8:	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each
LAFS.68.WHST.3.9:	Draw evidence from informational texts to support analysis reflection, and research.
LAFS.68.WHST.4.10:	Write routinely over extended time frames (in time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of
	discipline-specific tasks, purposes, and audiences. Use variables to represent two quantities in a real-world problem that change in relationship to one another: write an equation to express one
MAFS.6.EE.3.9:	quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.
MAFS.6.SP.2.4:	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
MAFS.6.SP.2.5:	 a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting
	Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
	construct viable arguments and critique the reasoning of others.
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting
	ividei with mathematics.
	Mathematically proticient students can apply the mathematics they know to solve problems arising in everyday life society, and the workplace. In

MAFS.K12.MP.4.1:	early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose. Standard Relation to Course: Supporting
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
MAFS.K12.MP.7.1:	Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
	Identify environmental factors that affect personal health.
HE.6.C.1.3:	Clarifications: Air and water quality, availability of sidewalks, contaminated food, and road hazards.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- $\label{eq:constraint} \textbf{4. Emphasizing students supporting answers based upon evidence from the text.}$
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- · Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The course also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGl/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education
Course Number: 2001010	Courses > Subject: Science > SubSubject:
	Earth/Space Sciences >
	Abbreviated Title: M/J EARTH/SPA SCI
	Course Length: Year (Y)
	Course Attributes:
	Class Size Core Required
	Course Level: 2
Course Status: Course Approved	
Grade Level(s): 6.7.8	

Educator Certifications

Science (Secondary Grades 7-12)	
Middle Grades Integrated Curriculum (Middle Grades 5-9)	
Earth/Space Science (Grades 6-12)	
Middle Grades General Science (Middle Grades 5-9)	
Chemistry (Grades 6-12)	
Physics (Grades 6-12)	

M/J Earth/Space Science (#2001010) 2022 - And Beyond

Course Standards

Use grade appropriate Nature of Science benchmarks (i.e. if this course is offered to seventh grade students, then the SC.7.N benchmarks should be integrated into the course content, and SC.6.N and SC.8.N benchmarks should be omitted from the seventh grade course).

SciELE.1 Describe and give examples of ways in which Larth's surfaces is built up and fam down by physical and chemical ways and phases. And examples of them is and three is a varied of them is and three is and t	Name	Description
Bespace Bespace in the three area variety of ifferent learning on a fairf's surface such as catables, during, then, then, mutation, globeler, dolta, and lake, dolta, do	SC.6.E.6.1:	Describe and give examples of ways in which Earth's surface is built up and torn down by physical and chemical weathering, erosion, and deposition.
Sci 6.7.1 Differentiate among radiation: conduction, and convection, the three machanisms by which hash is transferred through Earth's system. Sci 6.7.2 Threatplate and apply box the cycling of water between the atmosphere and buy toy there is and the outpart of the atmosphere and buy toy toy cycling of the atmosphere. Sci 6.7.3 There table and show the cycling of water between the atmosphere and the outpart of the atmosphere. Sci 6.7.3 There table and show the cycling of the atmosphere and the temperature differences between adv. water Sci 6.7.3 Differentiate have and the outpart of the atmosphere and the atmosphere and the atmosphere. Sci 6.7.3 Differentiate have and the outpart of the atmosphere atmosphere. Sci 6.7.3 Differentiate have and the outpart of the atmosphere atmosphere and the parts. Sci 6.7.3 Differentiate have and the outpart of the atmosphere and the atmosphere and the atmosphere and the atmosphere atmosphere. Sci 6.7.3 Differentiate have and the outpart of the atmosphere atmosphere. Sci 6.7.3 Differentiate have and the outpart of the atmosphere atmosphere. Sci 6.7.3 Differentiate have and the outpart of the atmosphere atmosphere. Sci 6.7.3 Differentiate atmosphere. Differentiate atmosphere. Differentiate atmosphere. Sci 6.7.3 Differentiate have atmosphere atmosphere. </td <td>SC.6.E.6.2:</td> <td>Recognize that there are a variety of different landforms on Earth's surface such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes and relate these landforms as they apply to Florida.</td>	SC.6.E.6.2:	Recognize that there are a variety of different landforms on Earth's surface such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes and relate these landforms as they apply to Florida.
65.6.6.7.2; Investigate and appy how the cycling of water between the a transphere and hydropyhere has an effect on water in pressure, wind direction and speed, and humdly and precipitation. 67.6.6.7.3; Describe how the cycling of water and accen currents till functionation and speed. 67.6.7.4; Differentiation and speed, and humdly and precipitation. 67.6.7.4; Differentiation and speed, and humdly and precipitation. 67.6.7.4; Differentiation and speed. 67.6.7.4; Differentiation and speed. 67.6.7.4; Differentiation and speed. 67.6.7.7; Investigate and device interaction water functionation. 67.6.7.7; Differentiation and speed. 67.6.7.7; Investigate and technication speed and device the and transphere proteins. 67.6.7.7; Devicities non-the composition and disculation. The and insulation till and and an and and an and and and and a	SC.6.E.7.1:	Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through Earth's system.
Cols. 21:73 Rescribe now global patterns such as the flat forem and ocean currents influence local westher in measurable forms such as temperature, all messure all direction and groups of all more patterns of almosphere, and blogshere. Sci. 8.7.4 Differentiate and allow influences global patterns of almosphere regregorize, almosphere, and blogshere. Sci. 8.7.4 Differentiate between weather and dimate. Sci. 8.7.7 Investigate how manual biology control thread-one matching biology and allow spectra. Sci. 8.7.7 Describe how manual biology control thread-one matching biology and statement. Sci. 8.7.7 Describe how manual biology control thread-one statement biology and statement. Sci. 8.7.8 Describe how manual biology control thread-one statement biology and statement and an expression. Sci. 8.7.12 Describe how manual biology control thread-one statement biology and statement biology and statement biology and statement and an expression. Sci. 8.7.12 Explain the office and biology and statement biology and statement and and statement and allow spectra. Sci. 8.7.12 Explain the office and biology and statement biology and statement and allow spectra. Sci. 8.7.12 Explain the office and biology and statement biology and statement and allow spectra. Sci. 8.7.12 Explain the office mark biology and statement biology and statement biology and statement explain that allow statement methods stade cancelling in state	SC.6.E.7.2:	Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate.
Sci & 2.4 Differentiate and allow interactions among the geosphere. bycropaptere, sycappiere, and biosphere. Sci & 2.7.6 Explain how entry provided by the sum influences global patterns of atmospheric movement and the temperature differences between air, water, and land. Sci & 2.7.6 Differentiate between weather and climate. Sci & 2.7.7 Investigate how nature disasters have affected human life in Florids. Sci & 4.7.8 Describe how the compaction and structure of the atmosphere proteins. If it and invalues the planet. Sci & 4.7.8 Describe how the compaction and structure of the atmosphere proteins. If it and invalues the planet. Sci & 4.7.8 Define a problem from the siding vade controllution. Sci and structure of the atmosphere proteins. Sci & 4.7.1 Define a problem from the siding vade controllution. Sci & 4.7.1 Explain the siding vade controllution. Sci & 4.7.1 Explain the siding vade information: make proteins. Sci & 4.7.1 Describe how the consolvery of vale of the siding vade information: make proteins. Sci & 4.7.1 Describe how the consolvery of vale of the siding vade information: make proteins. Sci & 4.7.1 Describe how the consolvery of vale of the siding vade information: make proteins. Sci & 4.7.2 Describe how tablement the side vade information: make proteins. Sci & 4.7.2 Describe how t	SC.6.E.7.3:	Describe how global patterns such as the jet stream and ocean currents influence local weather in measurable terms such as temperature, air pressure, wind direction and speed, and humidity and precipitation.
C 6.E.1.5. Explain how energy provide by the sin influences global patterns of atmospheric movement and the temperature differences between air, water, and tool. SC 6.F.7.6. Differentiate between waterins and climate. SC 6.F.7.7. Investigate to moratural dissocrations have affected to more their information. SC 6.F.7.7. Describe ways, human beings protect the more them atmosphere protects like and invalues the plantel. SC 6.F.7.7. Describe ways, human beings protect the more them atmosphere protects like and invalues. SC 6.F.7.7. Describe ways, human beings protect the more threat more protects like and invalues. SC 6.F.7.2. Explain how pactering invalues to the stamp and curriculum, use appropriate reference more matches to support scherific invalues, collect and organize data, interpret data in interpret data in more strengt and invalues. SC 6.F.1.2. Explain how pacentific investigations should be replicable. SC 6.F.1.2. Explain how issue investigation. SC 6.F.2.3. Recognize that science investigate like splantelike and explanations that file vedence. SC 6.F.2.3. Describe ways investigation in the science investigation in the splant data science investigation. SC 6.F.2.3. Recognize that science investigation is science interpretations are encountered. SC 6.F.2.3. Recognize that science investowerelike is datable science investigation in the net s	SC.6.E.7.4:	Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere.
52.6.2.7.6 Differentiate between weather and climate. 52.6.2.7.2 Investigate weather show affected burns if it in Fonds. 52.6.7.7.8 Describe how hourbuil disactions how affected burns if it in Fonds. 52.6.7.7.8 Describe how hourbuil disactions how affected burns if it in Fonds. 52.6.7.7.8 Describe how the composition and structure of the atmosphere protects if it and invulsions. 52.6.8.1.1 Scientific investigation of various types, such as systematic absorvations or a speriment. Identify variables, collect and organize dets, interpret dets in charts: table, and peptides and perimitations. 52.6.8.1.1 Explain hurly soertific investigations should be replicable. 52.6.8.1.2 Explain hurly soertific investigation structure of the adisping apportance. Stud Stoil crassing septanations in the relative benefits and imitations of each. 52.6.8.1.2 Explain hurly soertific investigation. 52.6.8.2.1 Distinguish science from other activities involving moving. 52.6.8.2.2 Explain hurly soertific investigation. 52.6.8.2.3 Recognize that science involves involving moving. 52.6.8.2.1 Distinguish science from other activities with male contributions to scientific knowledge cone from all kinds of backgrounds and possess waried talents, interests, and papis. 52.6.8.2.3 Recognize that scientis whor male contest in the sc	SC.6.E.7.5:	Explain how energy provided by the sun influences global patterns of atmospheric movement and the temperature differences between air, water, and land.
Sci A 1.7: Investigate how natural dissetser have affected human life in Florida. Sci A 1.3: Describes wegs human beings protect thershow from hazdroads weather and unsubarts the planet. Sci A 1.1: Define a prodem from the saft grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific understanding. Joint and carry out scientific understanding and carry scientific understanding and and propriate data, interpret tables, and yes scientific understanding or an opprinted. Sci A N 1.3: Explain the difference between an experiment and other types of scientific unvestigations. Anotal probability or planet is a scientific understanding or and explanet the anong groups of students conducting the same investigation. Sci A N 1.4: Descisus, compare: and negotiate methods used, results obtained and explanet the anong groups of students conducting the same investigation. Sci A N 1.5: Descigues that scientific hore/degies is durable because it is open to change as new evidence or interpretations are encountered. Sci A N 2.1: Descigues and explain that a scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered. Sci A N 3.1: Recognize and explain that a scientific knowledge come from all kinds of backgrounds and postess varied tables. Sci A N 3.1: Recognize and explain that a scientific knowledge is durable because it is growed within and the durable and scientific knowledge come from all kinds of backgrounds and scientific knowledge cofferent than kinds of backgrounds and scientifi	SC.6.E.7.6:	Differentiate between weather and climate.
Sci 6.5.9.8. Describe ways human beings protect themselves from hazardous weather and sun exposure. Sci 6.5.7.9. Describe ways human beings protect the description protects file and insulates the planet. Sci 6.5.7.9. Describe ways human beings protect the descriptions of supports scientific investigation of various types such as systematic observations or negatiments, identify variotides, collect and organize data, incepted sciences, analyse information, make predictions, and defend conclusions. Sci 6.5.1.1.2. Explain thy scientific investigations should be replicable. Sci 6.5.1.3. Explain thy scientific investigation should be replicable. Sci 6.5.1.3. Recognize that science investors cractify, only plant dotted types of scientific investigation, and explain that conducing the same investigation. Sci 6.5.1.3. Recognize that science investors cractify, only plant, that associate the science investigation. Sci 6.5.1.2. Explain that scientific knowledge is durable bacause it is open to change as new evidence or interpretations are encountered. Sci 6.5.1.2. Recognize that scientific knowledge is durable bacause it is open to change as new evidence or interpretations and is not simply a claim posed by an individual. Trus, the use of the term theory in science is knowledge come from alk inds of tacky ounds. Sci 6.5.3.3. Recognize and explain that a scientific knowledge is durable science ascing and gas. Sci 6.6.3.3.3. Recognize and explain that a scientific	SC.6.E.7.7:	Investigate how natural disasters have affected human life in Florida.
Sci & E.7.9*. Describe how the composition and structure of the atmosphere protects life and insulates the planet. Define a problem from the skith grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data interfere that scientific investigation of various types, such as systematic observations or experiments. Identify variables, collect and organize data, interpret data interfere that scientific investigations and scientific investigation, and explain the relative benefits and limitations of each scientific. Investigation and scientific and explanations among groups of students conducting the same investigation. Sci & N1.3 Descinguise that scientific investigation planet data desplanations among groups of students conducting the same investigation. Sci & N1.5 Recognize that scientific involvidege is durable because it is open to change as new evidence or interpretations are encountered. Sci & N2.3 Recognize and explain that a scientific involvidege cone from all kinds of backgrounds and posses writed talents, interests, and goals. Sci & N3.3 Cele several examples of scientific laws a description of a specific relationship under given conditions in the natural world. Thus, scientific laws a description of a specific relationship under given conditions in the natural world. Thus, scientific laws a description of a specific relationship and canny and and postace. Sci & N3.3 Geosphize and explain that a scientific laws a description of a specific relationship and canny and annotsinghy a claim po	SC.6.E.7.8:	Describe ways human beings protect themselves from hazardous weather and sun exposure.
Define a problem from the sixth grade curriculum, use appropriate reference materials to superments, identify variables, collect and organize data, interpret data SC 6.N 1.1 scientify investigation of variable as systematic conservations or operative mores, identify variables, collect and organize data, interpret data SC 6.N 1.2 Explain why scientific investigations should be replicable. SC 6.N 1.3 Explain why scientific investigations should be replicable. SC 6.N 1.4 Discuss, compare, and negotiale methods used, results obtained, and explainations arrong graze port studies inducting the same investigation. SC 6.N 2.3 Recognize that science investigations should be cause. It is oper to change as new evidence or interpretations are encountered. SC 6.N 2.3 Recognize that science investigation should be cause. It is operating explanations are encountered. SC 6.N 2.3 Recognize that science investigation is availed science is one analysis. SC 6.N 2.3 Recognize and explain that a scientific theory is a well supported and whelley accepted explanations in the natural world. Thus, scientific laws are different from soletal laws. SC 6.N 3.3 Geosprize and explain that a scientific two is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from soletal laws. SC 6.N 3.3 Geosprize and explain that a scientific theory is a well supported and wheley acoreting explanations in the natural world. Thus, scientific haws	SC.6.E.7.9:	Describe how the composition and structure of the atmosphere protects life and insulates the planet.
SC. 6.1.1.2 Explain why scientific investigations should be replicable. SC. 6.1.3 Explain he difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each. SC. 6.1.1.3 Discuss, compare, and negotiate methods used results obtained, and explanations among groups of students conducting the same investigation. SC. 6.1.1.2. Distinguish science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence. SC. 6.1.2.1. Distinguish science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence. SC. 6.1.2.3. Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is nel simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life. SC.6.1.3.3. Give several examples of scientific laws SC.6.1.3.3. Give several examples of scientific laws. SC.7.E.6.1 Describe the byers of the solid Earth, Including the lithosphere, the hot convecting mante, and the dense metallic liquid and solid cores. SC.7.E.6.2. Explain and yive samples of how physical evidence supports scientific hours and readical wide dating. SC.7.E.6.3. Lientify current of measuring the age of Earth and its parts, including the law of superposition and radioactive dating. SC.7.E.6.4. Explain	SC.6.N.1.1:	Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC. 6.N.1.3: Explain the difference between an experiment and other types of scientific investigation, applications, anong groups of students conducting the same investigation. SC. 6.N.1.4: Discuss, compare, and negotate methods used, results obtained, and explanations among groups of students conducting the same investigation. SC. 6.N.1.5: Recognize that sciencific involves, constraining, not just in designing experiments, but also in creating explanations that fit evidence. SC. 6.N.2.3: Recognize that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered. SC. 6.N.2.3: Recognize and explain that a scientific knowledge is durable because it is open to change as new evidence or interpretations and possess varied talents, interests, and goals. SC. 6.N.3.1: Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws. SC. 6.N.3.3: Give several examples of scientific laws. SC. 6.N.3.4: Identify the rote of models in the context of the sixth grade science benchmarks. SC. 7.E. 6.2: Identify unrent within the rock cycle and relate them to surface events (weathering and resion) and sub-surface events (plate tectonics and mountain building). SC.7.E. 6.4: Explain and yee examples of how physical evidence supports scientific theories that Earth scuss and examples in Earth's custal plates causes both slow and rapid.chungs in Earth's surface events (weathering and	SC.6.N.1.2:	Explain why scientific investigations should be replicable.
SC 6.1.1.4: Discuss. compare and negloited methods used, results obtained, and explanations among rougs of students conducting the same investigation. SC 6.1.1.5 Recognize that scientific knowless creativity, on just in designing experiments, but also in creating explanations that fit evidence. SC 6.1.2.2 Explain that scientific knowless creativity, on just in designing experiments, but also in creating explanations that fit evidence. SC 6.1.2.3 Recognize that scientific knowless creativity, inclusion to scientific knowledge come from all kinds of backgrounds and posses varied talents, interests, and goals. SC 6.1.3.1 Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how if is used in everyday life. SC 6.1.3.3 Give several examples of scientific laws. SC 6.1.4.4 Lentific laws is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws. SC 6.1.8.4 Identify the role of models in the context of the sixth grade science benchmarks. SC 7.E 6.1 Describe the layers of the solid Earth, including the linkosphere, the hot convecting mantle, and the dense metallic liquid and solid cores. SC 7.E 6.3 Identify the patterns within the rock cycle and relate them to surface events (weathering and erosion) and sub-surface events (balance and explain had a scientific theory of plate tactono: sand mountain building.	SC.6.N.1.3:	Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.
SC 6 M 15 Recognize that science involves creativity, not just in designing experiments, but design in ordering explanations that fill evidence. SC 6 M 2.1 Distinguish science from other activities involving thought. SC 6 M 2.3 Recognize that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered. SC 6 M 2.3 Recognize and explain that a scientific heory is objected is very different than how it is used in everyday life. SC 6 M 3.1 Recognize and explain that a scientific heory is a description of a specific relationship under given conditions in the natural world. Thus, scientific leavs are different from societal laws. SC 6 M 3.3 Give several examples of scientific leavs SC 7 E 6 1.2 Descripte the layes of the societ attrin thory in science is very different than scientific leavs. SC 7 E 6 1.2 Descripte the layes of the societ attrin through the lithosphere, the hot convecting mantie, and the dense metallic liquid and solid cores. SC 7 E 6 2. Identify the role of models in the context of the sixth grade science benchmarks. SC 7 E 6 4.3 Identify the role of models in the context of the sixth grade science benchmarks. SC 7 E 6 4.2 Identify uncert attrin theory or plate toxic on the solid farth. including the lithosphere, the hot convecting mantie, and the dense metallic liquid and solid cores. SC 7 E 6 4.3 Identify the role or models in the context of the sixth grade science benchmar	SC.6.N.1.4:	Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.
SC.6.N.2.1: Distinguish science from other activities involving thought. SC.6.N.2.2: Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered. SC.6.N.2.3: and goals. SC.6.N.2.3: Recognize that scientific theory is a well supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life. SC.6.N.2.3: Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from sociatal laws. SC.6.N.3.3: Give several examples of scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws. SC.7.E.6.1: Describe the layers of the solid Earth, including the lithosphere, the hot convecting mantie, and the dense metalle liquid and solid cores. SC.7.E.6.3: Identify urment methods for measuring the age of Earth and its parts, including the law of superposition and radioactive dating. SC.7.E.6.4: Explain and give examples of solublic evelopes scientific therois that Earth has evolved over geologicit mo due to natural processes. SC.7.E.6.5: Explaine that scientific theory of plate tectonics by describing how the movement of Earth's crustal plates causes both slow and rapid changes in Earth's surface. Including the asystem iscientific hurbaite anguality, changing the flaw of water.	SC.6.N.1.5:	Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.
SC 6.N 2.2 Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered. SC 6.N 2.3: Recognize that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered. SC 6.N 3.1: Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Trus, the use of the term theory in science is very different than how it is used in everyday life. SC 6.N 3.2: Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from social laws. SC 6.N 3.3: Give several examples of scientific laws. SC 7.E 6.1: Describe the layers of the scient Tarth, including the lithosphere, the hot convecting mantle, and the dense metallic liquid and solid cores. SC 7.E 6.3: Identify the patterns within the rock cycle and relate them to surface events (weathering and erosion) and sub-surface events (plate tectonics and mountain building). SC 7.E 6.4: Explain and give examples of how physical evidence supports describing how the movement of Earth's curstal plates causes both slow and rapid changes in Earth's surface. Including volcanic eruptions, and rouges, and mountain building. SC 7.E 6.7: Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and rouges and volcanic eruptions, and rouge and volcani ceruptions.	SC.6.N.2.1:	Distinguish science from other activities involving thought.
Sc. 6. N.2.3: Recognize that scientifists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals. Sc. 6. N.3.1: Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Trus, the use of the term theory in science is very different than how it is used in everyday life. Sc. 6. N.3.2: Recognize and explain that a scientific laws is a description of a specific relationship under given conditions in the natural world. Trus, scientific laws are different from societal laws. Sc. 6. N.3.3: Give several examples of scientific laws. Sc. 7. E. 6.1: Describe the layers of the solid Earth. Including the lithosphere, the hot convecting mantle, and the dense metallic liquid and solid cores. Sc. 7. E. 6.2: Identify the patterns within the rock cycle and relate them to surface events (weathering and erosion) and sub-surface events (plate tectonics and mountain building). Sc. 7. E. 6.2: Explore the scientific theory of plate tectonics by describing how the movement of farth's crustal plates causes both slow and rapid changes in Earth's surfae, including volcanic eruptions, earthquakes, and mountain building. Sc. 7. E. 6.3: Explore the scientific theory of plate tectonics by describing how the movement of farth's crustal plates causes both slow and rapid changes in flow of valater. Sc. 7. E. 6.4: Explore the scientific nearch mathe and the part in transmission, air and water quality, changing the flow of valater. <td>SC.6.N.2.2:</td> <td>Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.</td>	SC.6.N.2.2:	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.
SC.6 N.3.1: Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in scient than how it is used in everyday life. SC.6 N.3.2: Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws. SC.6 N.3.3: Give several examples of scientific laws. SC.7 E.6.1: Describe the layers of the soil Earth, including the lithosphere, the hot convecting mantle, and the dense metallic liquid and solid cores. SC.7 E.6.2: Identify the patterns within the rock cycle and relate them to surface events (weathering and erosion) and sub-surface events (plate tectonics and mountain building). SC.7 E.6.3: Identify the pattern methods for measuring the age of Earth and its parts, including the law of superposition and radioactive dating. SC.7 E.6.4: Explore the scientific theory of plate tectonics by describing how the movement of Earth's crustal plates causes both slow and rapid changes in Earth's surface, including volcanic eruptions, earthquakes, and mountain building. SC.7 E.6.6: Identify the impact that humans have had on Earth, such as deforestation, urbanization, descrification, erosion, air and water quality, changing the flow of water. SC.7 F.6.7: Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean basins. SC.7 F.6.7:	SC.6.N.2.3:	Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals.
SC 6.N 3.2: Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws. SC 6.N 3.3: Give several examples of scientific laws. SC 6.N 3.4: Identify the role of models in the context of the sixth grade science benchmarks. SC 7.E 6.1: Describe the layers of the solid Earth, including the lihosphere, the hot convecting mantle, and the dense metallic liquid and solid coras. Identify the patterns within the rock cycle and relate them to surface events (weathering and erosion) and sub-surface events (plate tectonics and mountain building). SC 7.E 6.4: Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes. SC 7.E 6.6: Lidentify the impact that humans have had on Earth, such as deforestation, urbanization, descritification, erosion, air and water quality, changing the flow of water. SC 7.E 6.7: Bescingize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean basins. SC 7.N.1.1: Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts. tables, and graphics, analyze information, make predictions and defend conclusions. SC 7.N.1.2: Differentitate replicatio	SC.6.N.3.1:	Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.
SC.6.N.3.3: Give several examples of scientific laws. SC.6.N.3.4: Identify the role of models in the context of the sixth grade science benchmarks. SC.7.E.6.1: Describe the layers of the solid Earth, including the lithosphere, the hot convecting mantle, and the dense metallic liquid and solid cores. SC.7.E.6.2: Identify the patterns within the rock cycle and relate them to surface events (weathering and erosion) and sub-surface events (plate tectonics and mountain building). SC.7.E.6.3: Identify ourrent methods for measuring the age of Earth and lits parts, including the law of superposition and radioactive dating. SC.7.E.6.4: Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes. SC.7.E.6.6: Earth's surface, including volcanic eruptions, earthquakes, and mountain building. SC.7.E.6.6: Floor water. SC.7.E.6.7: Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean basins. Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and cefend conclusions. SC.7.N.1.2: Differentiate replication (by others) from repetition (mult	SC.6.N.3.2:	Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.
SC A N.3.4: Identify the role of models in the context of the sixth grade science benchmarks. SC 7.E. 6.1: Describe the layers of the solid Earth, including the lithosphere, the hot convecting mantle, and the dense metallic liquid and solid cores. SC 7.E. 6.2: identify the patterns within the rock cycle and relate them to surface events (weathering and erosion) and sub-surface events (plate tectonics and mountain building). SC 7.E. 6.3: Identify current methods for measuring the age of Earth and its parts, including the law of superposition and radioactive dating. SC 7.E. 6.4: Explore the scientific theory of plate tectonics by describing how the movement of Earth's crustal plates causes both slow and rapid changes in Earth's surface, including volcanic eruptions, earthquakes, and mountain building. SC 7.E. 6.6: Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water. SC 7.E. 6.7: Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean basins. SC 7.N.1.1: Schlifterentiate replication (ty others) from repetition (multiple trials). SC 7.N.1.2: Differentiate replication (ty others) from repetition (multiple trials). SC 7.N.1.3: Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that empirical evidence is the cumulative body of observations of a nat	SC.6.N.3.3:	Give several examples of scientific laws.
SC.7.E.6.1: Describe the layers of the solid Earth, including the lithosphere, the hot convecting mantle, and the dense metallic liquid and solid cores. SC.7.E.6.2: Identify the patterns within the rock cycle and relate them to surface events (weathering and erosion) and sub-surface events (plate tectonics and mountain building). SC.7.E.6.3: Identify current methods for measuring the age of Earth and its parts, including the law of superposition and radioactive dating. SC.7.E.6.4: Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes. SC.7.E.6.5: Explore the scientific theory of plate tectonics by describing how the movement of Earth's curstal plates causes both slow and rapid changes in flow of water. SC.7.E.6.6: Identify the impact that humans have had on Earth, such as deforestation, urbanization, describing, and creates mountains and ocean basins. SC.7.E.6.7: Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean basins. SC.7.N.1.1: Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions. SC.7.N.1.2: Differentiate replication (by others) from repetition (multiple trials). <td>SC.6.N.3.4:</td> <td>Identify the role of models in the context of the sixth grade science benchmarks.</td>	SC.6.N.3.4:	Identify the role of models in the context of the sixth grade science benchmarks.
SC.7.E.6.2:Identify the patterns within the rock cycle and relate them to surface events (weathering and erosion) and sub-surface events (plate tectonics and mountain building).SC.7.E.6.3:Identify current methods for measuring the age of Earth and its parts, including the law of superposition and radioactive dating.SC.7.E.6.4:Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes.SC.7.E.6.5:Explore the scientific theory of plate tectonics by describing how the movement of Earth's crustal plates causes both slow and rapid changes in Earth's surface, including volcanic eruptions, earthquakes, and mountain building.SC.7.E.6.6:Identify the impact that humans have had on Earth, such as deforestation, urbanization, descrification, erosion, air and water quality, changing the flow of water.SC.7.E.6.7:Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean 	SC.7.E.6.1:	Describe the layers of the solid Earth, including the lithosphere, the hot convecting mantle, and the dense metallic liquid and solid cores.
SC.7.E.6.3: Identify current methods for measuring the age of Earth and its parts, including the law of superposition and radioactive dating. SC.7.E.6.4: Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes. SC.7.E.6.5: Explore the scientific theory of plate tectonics by describing how the movement of Earth's crustal plates causes both slow and rapid changes in Earth's surface, including volcanic eruptions, earthquakes, and mountain building. SC.7.E.6.6: Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water. SC.7.E.6.7: Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean basins. Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions. SC.7.N.1.2: Differentiate replication (by others) from repetition (multiple trials). SC.7.N.1.4: Identify test variables (independent variables) and outcome variables (dependent variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation. SC.7.N.1.5: Describe the methods used in t	SC.7.E.6.2:	Identify the patterns within the rock cycle and relate them to surface events (weathering and erosion) and sub-surface events (plate tectonics and mountain building).
SC.7.E.6.4: Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes. SC.7.E.6.5: Explore the scientific theory of plate tectonics by describing how the movement of Earth's crustal plates causes both slow and rapid changes in Earth's surface. Including volcanic eruptions, earthquakes, and mountain building. SC.7.E.6.6: Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water. SC.7.E.6.7: Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean basins. Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions. SC.7.N.1.2: Differentiate replication (by others) from repetition (multiple trials). SC.7.N.1.3: Distinguish between an experiment (which must involve the identification and control of variables) in an experiment. SC.7.N.1.4: Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment. SC.7.N.1.5: Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics. </td <td>SC.7.E.6.3:</td> <td>Identify current methods for measuring the age of Earth and its parts, including the law of superposition and radioactive dating.</td>	SC.7.E.6.3:	Identify current methods for measuring the age of Earth and its parts, including the law of superposition and radioactive dating.
Sc. 7.E. 6.5: Explore the scientific theory of plate tectonics by describing how the movement of Earth's crustal plates causes both slow and rapid changes in Earth's surface, including volcanic eruptions, earthquakes, and mountain building. sc. 7.E. 6.6: Identify the impact that humans have had on Earth, such as deforestation, urbanization, describing and water quality, changing the flow of water. sc. 7.E. 6.7: Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean basins. Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions. sc.7.N.1.2: Differentiate replication (by others) from repetition (multiple trials). sc.7.N.1.3: Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation. sc.7.N.1.4: Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment. sc.7.N.1.6: Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based. sc.7.N.1.7: Explain that scientific knowledge is the result of a great deal o	SC.7.E.6.4:	Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes.
SC.7.E.6.6:Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.SC.7.E.6.7:Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean basins.Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.SC.7.N.1.2:Differentiate replication (by others) from repetition (multiple trials).SC.7.N.1.3:Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.SC.7.N.1.4:Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.SC.7.N.1.5:Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.SC.7.N.1.6:Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.SC.7.N.1.7:Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science or new interpretations are encountered.SC.7.N.2.1:Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encoun	SC.7.E.6.5:	Explore the scientific theory of plate tectonics by describing how the movement of Earth's crustal plates causes both slow and rapid changes in Earth's surface, including volcanic eruptions, earthquakes, and mountain building.
SC.7.E.6.7: Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean basins. SC.7.E.6.7: Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions. SC.7.N.1.2: Differentiate replication (by others) from repetition (multiple trials). SC.7.N.1.3: Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation. SC.7.N.1.4: Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment. SC.7.N.1.6: Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based. SC.7.N.1.7: Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community. sc.7.N.2.1: Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered. Sc.7.N.3.1: Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them	SC.7.E.6.6:	Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.
Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry outSC.7.N.1.1:scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.SC.7.N.1.2:Differentiate replication (by others) from repetition (multiple trials).SC.7.N.1.3:Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.SC.7.N.1.4:Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.SC.7.N.1.5:Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.SC.7.N.1.6:Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.SC.7.N.2.1:Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.SC.7.N.3.1:Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports 	SC.7.E.6.7:	Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean basins.
SC.7.N.1.2:Differentiate replication (by others) from repetition (multiple trials).SC.7.N.1.3:Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.SC.7.N.1.4:Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.SC.7.N.1.5:Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.SC.7.N.1.6:Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.SC.7.N.1.7:Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.SC.7.N.2.1:Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.SC.7.N.3.1:Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.SC.7.N.3.2:Identify the benefits and limitations of the use of scientific models.	SC.7.N.1.1:	Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.7.N.1.3:Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.SC.7.N.1.4:Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.SC.7.N.1.5:Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.SC.7.N.1.6:Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.SC.7.N.1.7:Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.SC.7.N.2.1:Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.SC.7.N.3.1:Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.SC.7.N.3.2:Identify the benefits and limitations of the use of scientific models.	SC.7.N.1.2:	Differentiate replication (by others) from repetition (multiple trials).
SC.7.N.1.4: Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment. SC.7.N.1.5: Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics. SC.7.N.1.6: Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based. SC.7.N.1.7: Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community. SC.7.N.2.1: Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered. SC.7.N.3.1: Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them. SC.7.N.3.2: Identify the benefits and limitations of the use of scientific models.	SC.7.N.1.3:	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.
SC.7.N.1.5: Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics. SC.7.N.1.6: Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based. SC.7.N.1.7: Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community. SC.7.N.2.1: Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered. SC.7.N.3.1: Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them. SC.7.N.3.2: Identify the benefits and limitations of the use of scientific models.	SC.7.N.1.4:	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.
SC.7.N.1.6: Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based. SC.7.N.1.7: Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community. SC.7.N.1.7: Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered. SC.7.N.2.1: Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them. SC.7.N.3.1: Identify the benefits and limitations of the use of scientific models.	SC.7.N.1.5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.
SC.7.N.1.7: Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community. SC.7.N.2.1: Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered. SC.7.N.3.1: Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them. SC.7.N.3.2: Identify the benefits and limitations of the use of scientific models.	SC.7.N.1.6:	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.
SC.7.N.2.1: Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered. SC.7.N.3.1: Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them. SC.7.N.3.2: Identify the benefits and limitations of the use of scientific models.	SC.7.N.1.7:	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.
SC.7.N.3.1: Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them. SC.7.N.3.2: Identify the benefits and limitations of the use of scientific models.	SC.7.N.2.1:	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.
SC.7.N.3.2: Identify the benefits and limitations of the use of scientific models.	SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.
	SC.7.N.3.2:	Identify the benefits and limitations of the use of scientific models.

SC.8.E.5.1:	Recognize that there are enormous distances between objects in space and apply our knowledge of light and space travel to understand this distance.
SC.8.E.5.2:	Recognize that the universe contains many billions of galaxies and that each galaxy contains many billions of stars.
SC.8.E.5.3:	Distinguish the hierarchical relationships between planets and other astronomical bodies relative to solar system, galaxy, and universe, including distance, size, and composition.
SC.8.E.5.4:	Explore the Law of Universal Gravitation by explaining the role that gravity plays in the formation of planets, stars, and solar systems and in determining their motions.
SC.8.E.5.5:	Describe and classify specific physical properties of stars: apparent magnitude (brightness), temperature (color), size, and luminosity (absolute brightness).
SC.8.E.5.6:	Create models of solar properties including: rotation, structure of the Sun, convection, sunspots, solar flares, and prominences.
SC.8.E.5.7:	Compare and contrast the properties of objects in the Solar System including the Sun, planets, and moons to those of Earth, such as gravitational force, distance from the Sun, speed, movement, temperature, and atmospheric conditions.
SC.8.E.5.8:	Compare various historical models of the Solar System, including geocentric and heliocentric.
SC.8.E.5.9:	Explain the impact of objects in space on each other including:1. the Sun on the Earth including seasons and gravitational attraction2. the Moon on the Earth, including phases, tides, and eclipses, and the relative position of each body.
SC.8.E.5.10:	Assess how technology is essential to science for such purposes as access to outer space and other remote locations, sample collection, measurement, data collection and storage, computation, and communication of information
SC.8.E.5.11:	Identify and compare characteristics of the electromagnetic spectrum such as wavelength, frequency, use, and hazards and recognize its application to an understanding of planetary images and satellite photographs.
SC 8 F 5 12 [.]	Summarize the effects of space exploration on the economy and culture of Florida
SC.8.N.1.1:	Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.8.N.1.2:	Design and conduct a study using repeated trials and replication.
SC.8.N.1.3:	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.
SC.8.N.1.4:	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.
SC.8.N.1.6:	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
SC.8.N.2.1:	Distinguish between scientific and pseudoscientific ideas.
SC.8.N.2.2:	Discuss what characterizes science and its methods.
SC.8.N.3.1:	Select models useful in relating the results of their own investigations.
SC.8.N.3.2:	Explain why incories may be modified but are rarely discarded.
SC 8 N 4 2	Explain that science is one of the processes that can be used to inform decision making at the community, state, hational, and international revers.
MA.K12.MTR.1.1:	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach.
	Cultivate a community of growth mindset learners.
	Foster perseverance in students by choosing tasks that are challenging.
	Develop students' ability to analyze and problem solve.
	Recognize students' effort when solving challenging problems.
	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations.
MA.K12.MTR.2.1:	 Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations. Complete tasks with mathematical fluency.
	 Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence.

MA.K12.MTR.3.1:	Adapt procedures to apply them to a new context.Use feedback to improve efficiency when performing calculations.
	Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively.
MA.K12.MTR.4.1:	 Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence.
	Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts.
MA.K12.MTR.5.1:	 Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations.
	 Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems
MA.K12.MTR.6.1:	Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications:
	 Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences.
MA.K12.MTR.7.1:	 Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications:
	 Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details
	from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.

ELA.K12.EE.1.1:	
	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
	Identify environmental factors that affect personal health.
HE.6.C.1.3:	Clarifications: Air and water quality, availability of sidewalks, contaminated food, and road hazards.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- · Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.

- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Course Number: 2001010

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: Earth/Space Sciences > Abbreviated Title: M/J EARTH/SPA SCI Course Length: Year (Y) Course Attributes: • Class Size Core Required Course Level: 2

Course Status: State Board Approved Grade Level(s): 6,7,8

Educator Certifications

Science (Secondary Grades 7-12) Middle Grades Integrated Curriculum (Middle Grades 5-9) Earth/Space Science (Grades 6-12) Middle Grades General Science (Middle Grades 5-9) Chemistry (Grades 6-12) Physics (Grades 6-12)

M/J Earth/Space Science, Advanced (#2001020) 2015 - 2022

(current)

Course Standards

Use grade appropriate Nature of Science benchmarks (i.e. if this course is offered to seventh grade students, then the SC.7.N benchmarks should be integrated into the course content, and SC.6.N and SC.8.N benchmarks should be omitted from the seventh grade course).

Name	Description
SC.6.E.6.1:	Describe and give examples of ways in which Earth's surface is built up and torn down by physical and chemical weathering, erosion, and deposition.
SC.6.E.6.2:	Recognize that there are a variety of different landforms on Earth's surface such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes and relate these landforms as they apply to Florida.
SC.6.E.7.1:	Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through Earth's system.
SC.6.E.7.2:	Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate.
SC.6.E.7.3:	Describe how global patterns such as the jet stream and ocean currents influence local weather in measurable terms such as temperature, air pressure, wind direction and speed, and humidity and precipitation.
SC.6.E.7.4:	Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere.
SC.6.E.7.5:	Explain how energy provided by the sun influences global patterns of atmospheric movement and the temperature differences between air, water, and land.
SC.6.E.7.6:	Differentiate between weather and climate.
SC.6.E.7.7:	Investigate how natural disasters have affected human life in Florida.
SC.6.E.7.8:	Describe ways human beings protect themselves from hazardous weather and sun exposure.
SC.6.E.7.9:	Describe how the composition and structure of the atmosphere protects life and insulates the planet.
SC.7.E.6.1:	Describe the layers of the solid Earth, including the lithosphere, the hot convecting mantle, and the dense metallic liquid and solid cores.
SC.7.E.6.2:	Identify the patterns within the rock cycle and relate them to surface events (weathering and erosion) and sub-surface events (plate tectonics and mountain building).
SC.7.E.6.3:	Identify current methods for measuring the age of Earth and its parts, including the law of superposition and radioactive dating.
SC.7.E.6.4:	Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes.
SC.7.E.6.5:	Explore the scientific theory of plate tectonics by describing how the movement of Earth's crustal plates causes both slow and rapid changes in Earth's surface, including volcanic eruptions, earthquakes, and mountain building.
SC.7.E.6.6:	Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.
SC.7.E.6.7:	Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean basins.
SC.7.N.1.1:	Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.7.N.1.2:	Differentiate replication (by others) from repetition (multiple trials).
SC.7.N.1.3:	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.
SC.7.N.1.4:	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.
SC.7.N.1.5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.
SC.7.N.1.6:	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.
SC.7.N.1.7:	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.
SC.7.N.2.1:	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.
SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.
SC.7.N.3.2:	Identify the benefits and limitations of the use of scientific models.
SC.8.E.5.1:	Recognize that there are enormous distances between objects in space and apply our knowledge of light and space travel to understand this distance.
SC.8.E.5.2:	Recognize that the universe contains many billions of galaxies and that each galaxy contains many billions of stars.
SC.8.E.5.3:	Distinguish the hierarchical relationships between planets and other astronomical bodies relative to solar system, galaxy, and universe, including distance, size, and composition.
SC.8.E.5.4:	Explore the Law of Universal Gravitation by explaining the role that gravity plays in the formation of planets, stars, and solar systems and in determining their motions.
SC.8.E.5.5:	Describe and classify specific physical properties of stars: apparent magnitude (brightness), temperature (color), size, and luminosity (absolute brightness).
SC.8.E.5.6:	Create models of solar properties including: rotation, structure of the Sun, convection, sunspots, solar flares, and prominences.
SC.8.E.5.7:	Compare and contrast the properties of objects in the Solar System including the Sun, planets, and moons to those of Earth, such as gravitational force, distance from the Sun, speed, movement, temperature, and atmospheric conditions.
SC.8.E.5.8:	Compare various historical models of the Solar System, including geocentric and heliocentric.
	Explain the impact of objects in space on each other including:

SC.8.E.5.9:	1. the Sun on the Earth including seasons and gravitational attraction
00.0.2.0.7.	2. the Moon on the Earth, including phases, tides, and eclipses, and the relative position of each body.
SC.8.E.5.10:	Assess how technology is essential to science for such purposes as access to outer space and other remote locations, sample collection, measurement, data collection and storage, computation, and communication of information.
SC.8.E.5.11:	Identify and compare characteristics of the electromagnetic spectrum such as wavelength, frequency, use, and hazards and recognize its application to an understanding of planetary images and satellite photographs.
SC.8.E.5.12:	Summarize the effects of space exploration on the economy and culture of Florida.
SC.8.N.1.1:	Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.8.N.1.2:	Design and conduct a study using repeated trials and replication.
SC.8.N.1.3:	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge
SC 8 N 1 4	claim. Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.
SC.8.N.1.6:	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
SC.8.N.2.1:	Distinguish between scientific and pseudoscientific ideas.
SC.8.N.2.2:	Discuss what characterizes science and its methods.
SC.8.N.3.1:	Select models useful in relating the results of their own investigations.
SC.8.N.3.2:	Explain why theories may be modified but are rarely discarded.
SC.8.N.4.1:	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.
SC.8.N.4.2:	Explain how political, social, and economic concerns can affect science, and vice versa.
SC.912.E.5.4:	Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth.
SC.912.E.6.1:	Describe and differentiate the layers of Earth and the interactions among them.
SC.912.E.6.2:	Connect surface features to surface processes that are responsible for their formation.
SC.912.E.0.3: SC.912.E.7.3:	Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.
SC.912.E.7.5:	Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions.
SC.912.E.7.6:	Relate the formation of severe weather to the various physical factors.
LAFS.68.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts.
LAFS.68.RST.1.2:	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
LAFS.68.RST.1.3:	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LAFS.68.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.
LAFS.68.RST.2.5:	Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.
LAFS.68.RS1.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
LAFS.68.RST.3.7:	diagram, model, graph, or table).
LAFS.68.RST.3.8:	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
LAFS.68.RST.3.9:	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
	Write arguments focused on <i>discipline-specific content</i> . a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.
LAFS.68.WHST.1.1:	 b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.
	c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style.
	e. Provide a concluding statement or section that follows from and supports the argument presented.
LAFS.68.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples. c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to inform about or explain the topic.
	 e. Establish and maintain a formal style and objective tone. f. Provide a concluding statement or section that follows from and supports the information or explanation presented.
LAFS.68.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.68.WHST.2.5:	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
LAFS.68.WHST.2.6:	Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.
LAFS.68.WHST.3.7:	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration

LAFS.68.WHST.3.8:	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
LAFS.68.WHST.3.9:	Draw evidence from informational texts to support analysis reflection, and research.
LAFS.68.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
LAFS.7.SL.1.1:	 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. b. Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed. c. Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed. d. Acknowledge new information expressed by others and, when warranted, modify their own views.
LAFS.7.SL.1.2:	Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.
LAFS.7.SL.1.3:	Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.
LAFS.7.SL.2.4:	Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eve contact, adequate volume, and clear pronunciation
LAFS.7.SL.2.5:	Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.
MAFS.6.EE.3.9:	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation $d = 65t$ to represent the relationship between distance and time.
MAFS.6.SP.2.4:	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
MAFS.6.SP.2.5:	 Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.
MAFS.7.SP.2.4:	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book are generally longer than the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book are generally longer than the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book are generally longer than the words in a chapter of a fourth-grade science book are generally longer than the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book are generally longer than the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book are generally longer than the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a seventh-grade science book.
MAFS.7.SP.3.5:	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
MAFS.K12.MP.1.1:	Make sense of problems and persevere in solving them. Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches. Standard Relation to Course: Supporting
	Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others.
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting Model with mathematics.

MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
MAFS.K12.MP.8.1:	Look for and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results. Standard Relation to Course: Supporting
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
HE.6.C.1.3:	Identity environmental factors that affect personal health. Clarifications: Air and water quality, availability of cidewalks, contaminated food, and read bazards.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate

critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGl/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION	
Course Number: 2001020	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: Earth/Space Sciences > Abbreviated Title: M/J EARTH/SPA SCI ADV
	Course Attributes:
	Class Size Core Required
	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 6,7,8	

Educator Certifications

Science (Secondary Grades 7-12) Middle Grades Integrated Curriculum (Middle Grades 5-9) Earth/Space Science (Grades 6-12) Middle Grades General Science (Middle Grades 5-9) Chemistry (Grades 6-12) Physics (Grades 6-12)

M/J Earth/Space Science, Advanced (#2001020) 2022 - And

Beyond

Course Standards

Use grade appropriate Nature of Science benchmarks (i.e. if this course is offered to seventh grade students, then the SC.7.N benchmarks should be integrated into the course content, and SC.6.N and SC.8.N benchmarks should be omitted from the seventh grade course).

Name	Description
SC.6.E.6.1:	Describe and give examples of ways in which Earth's surface is built up and torn down by physical and chemical weathering, erosion, and deposition.
SC.6.E.6.2:	Recognize that there are a variety of different landforms on Earth's surface such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes and relate these landforms as they apply to Florida.
SC.6.E.7.1:	Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through Earth's system.
SC.6.E.7.2:	Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate.
SC.6.E.7.3:	Describe how global patterns such as the jet stream and ocean currents influence local weather in measurable terms such as temperature, air pressure, wind direction and speed, and humidity and precipitation.
SC.6.E.7.4:	Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere.
SC.6.E.7.5:	Explain how energy provided by the sun influences global patterns of atmospheric movement and the temperature differences between air, water, and land.
SC.6.E.7.6:	Differentiate between weather and climate.
SC.6.E.7.7:	Investigate how natural disasters have affected human life in Florida.
SC.6.E.7.8:	Describe ways human beings protect themselves from hazardous weather and sun exposure.
SC.6.E.7.9:	Describe how the composition and structure of the atmosphere protects life and insulates the planet.
SC.7.E.6.1:	Describe the layers of the solid Earth, including the lithosphere, the hot convecting mantle, and the dense metallic liquid and solid cores.
SC.7.E.6.2:	Identify the patterns within the rock cycle and relate them to surface events (weathering and erosion) and sub-surface events (plate tectonics and mountain building).
SC.7.E.6.3:	Identify current methods for measuring the age of Earth and its parts, including the law of superposition and radioactive dating.
SC.7.E.6.4:	Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes.
SC.7.E.6.5:	Explore the scientific theory of plate tectonics by describing how the movement of Earth's crustal plates causes both slow and rapid changes in Earth's surface, including volcanic eruptions, earthquakes, and mountain building.
SC.7.E.6.6:	Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.
SC.7.E.6.7:	Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean basins.
SC.7.N.1.1:	Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.7.N.1.2:	Differentiate replication (by others) from repetition (multiple trials).
SC.7.N.1.3:	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.
SC.7.N.1.4:	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.
SC.7.N.1.5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.
SC.7.N.1.6:	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.
SC.7.N.1.7:	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.
SC.7.N.2.1:	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.
SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.
SC.7.N.3.2:	Identify the benefits and limitations of the use of scientific models.
SC.8.E.5.1:	Recognize that there are enormous distances between objects in space and apply our knowledge of light and space travel to understand this distance.
SC.8.E.5.2:	Recognize that the universe contains many billions of galaxies and that each galaxy contains many billions of stars.
SC.8.E.5.3:	Distinguish the hierarchical relationships between planets and other astronomical bodies relative to solar system, galaxy, and universe, including distance, size, and composition.
SC.8.E.5.4:	Explore the Law of Universal Gravitation by explaining the role that gravity plays in the formation of planets, stars, and solar systems and in determining their motions.
SC.8.E.5.5:	Describe and classify specific physical properties of stars: apparent magnitude (brightness), temperature (color), size, and luminosity (absolute brightness).
SC.8.E.5.6:	Create models of solar properties including: rotation, structure of the Sun, convection, sunspots, solar flares, and prominences.
SC.8.E.5.7:	Compare and contrast the properties of objects in the Solar System including the Sun, planets, and moons to those of Earth, such as gravitational force, distance from the Sun, speed, movement, temperature, and atmospheric conditions.
SC.8.E.5.8:	Compare various historical models of the Solar System, including geocentric and heliocentric.
1	Explain the impact of objects in space on each other including:

SC.8.E.5.9:	1. the Sun on the Earth including seasons and gravitational attraction
	2. the Moon on the Earth, including phases, tides, and eclipses, and the relative position of each body.
SC.8.E.5.10:	Assess how technology is essential to science for such purposes as access to outer space and other remote locations, sample collection, measurement, data collection and storage, computation, and communication of information.
SC.8.E.5.11:	Identify and compare characteristics of the electromagnetic spectrum such as wavelength, frequency, use, and hazards and recognize its application to an understanding of planetary images and satellite photographs.
SC.8.E.5.12:	Summarize the effects of space exploration on the economy and culture of Florida.
SC.8.N.1.1:	Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.8.N.1.2:	Design and conduct a study using repeated trials and replication.
SC.8.N.1.3:	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.
SC.8.N.1.4:	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.
SC.8.N.1.6:	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
SC.8.N.2.1:	Distinguish between scientific and pseudoscientific ideas.
SC.8.N.2.2:	Discuss what characterizes science and its methods.
SC.8.N.3.1:	Select models useful in relating the results of their own investigations.
SC.8.N.3.2:	Explain why theories may be modified but are rarely discarded.
SC.8.N.4.1:	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.
SC.8.N.4.2:	Explain how political, social, and economic concerns can affect science, and vice versa.
SC.912.E.5.4:	Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth.
SC.912.E.6.1:	Describe and differentiate the layers of Earth and the interactions among them.
SC.912.E.6.2:	Connect surface features to surface processes that are responsible for their formation.
SC.912.E.6.3:	Analyze the scientific theory of plate tectonics and identify related major processes and features as a result of moving plates.
SC.912.E.7.3:	Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.
SC.912.E.7.5:	Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions.
SC.912.E.7.6:	Relate the formation of severe weather to the various physical factors.
MA.K12.MTR.1.1:	 Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach. Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations
	 Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	 Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
	Offer multiple opportunities for students to practice efficient and generalizable methods.

	• Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
	 Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes.
MA.K12.MTR.4.1:	Construct possible arguments based on evidence.
	 Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems.
MA.K12.MTR.5.1:	 Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations.
	 Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
	 Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts:
MA.K12.MTR.7.1:	 Connect manifernatical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
	 Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
ELA.K12.EE.1.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.

	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications:
	See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills.
	Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
	Identify environmental factors that affect personal health.
HE.6.C.1.3:	Clarifications: Air and water quality, availability of sidewalks, contaminated food, and road hazards.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGl/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: Earth/Space Sciences > Abbreviated Title: M/J EARTH/SPA SCI ADV Course Length: Year (Y) Course Attributes: • Class Size Core Required Course Level: 3

Course Status: State Board Approved Grade Level(s): 6,7,8

Educator Certifications

Science (Secondary Grades 7-12) Middle Grades Integrated Curriculum (Middle Grades 5-9) Earth/Space Science (Grades 6-12) Middle Grades General Science (Middle Grades 5-9) Chemistry (Grades 6-12) Physics (Grades 6-12)

M/J STEM Astronomy and Space Science (#2001025) 2015 - 2022 (current)

Name	Description
SC.6.E.7.9:	Describe how the composition and structure of the atmosphere protects life and insulates the planet.
SC.6.N.1.2:	Explain why scientific investigations should be replicable.
SC.6.N.1.3:	Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.
SC.6.N.1.4:	Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.
SC.6.N.1.5:	Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.
SC.6.N.2.1:	Distinguish science from other activities involving thought.
SC.6.N.2.2:	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.
SC.6.N.2.3:	Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals.
SC.6.N.3.1:	Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.
SC.6.N.3.2:	Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.
SC.6.N.3.3:	Give several examples of scientific laws.
SC.6.N.3.4:	Identify the role of models in the context of the sixth grade science benchmarks.
SC.7.N.1.2:	Differentiate replication (by others) from repetition (multiple trials).
SC.7.N.1.3:	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.
SC.7.N.1.4:	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.
SC.7.N.1.5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, and physics.
SC.7.N.1.6:	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.
SC 7 N 1 7	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community
SC.7.N.2.1:	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.
SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.
SC.7.N.3.2:	Identify the benefits and limitations of the use of scientific models.
SC.8.E.5.1:	Recognize that there are enormous distances between objects in space and apply our knowledge of light and space travel to understand this distance.
SC.8.E.5.2:	Recognize that the universe contains many billions of galaxies and that each galaxy contains many billions of stars.
SC.8.E.5.3:	Distinguish the hierarchical relationships between planets and other astronomical bodies relative to solar system, galaxy, and universe, including distance, size, and composition.
SC.8.E.5.4:	Explore the Law of Universal Gravitation by explaining the role that gravity plays in the formation of planets, stars, and solar systems and in determining their motions.
SC.8.E.5.5:	Describe and classify specific physical properties of stars: apparent magnitude (brightness), temperature (color), size, and luminosity (absolute brightness).
SC.8.E.5.6:	Create models of solar properties including: rotation, structure of the Sun, convection, sunspots, solar flares, and prominences.
SC.8.E.5.7:	Compare and contrast the properties of objects in the Solar System including the Sun, planets, and moons to those of Earth, such as gravitational force, distance from the Sun, speed, movement, temperature, and atmospheric conditions.
SC.8.E.5.8:	Compare various historical models of the Solar System, including geocentric and heliocentric.
	Explain the impact of objects in space on each other including:
SC.8.E.5.9:	1. the Sun on the Earth including seasons and gravitational attraction
	2. the Moon on the Earth, including phases, tides, and eclipses, and the relative position of each body.
SC.8.E.5.10:	Assess how technology is essential to science for such purposes as access to outer space and other remote locations, sample collection, measurement, data collection and storage, computation, and communication of information.
SC.8.E.5.11:	Identify and compare characteristics of the electromagnetic spectrum such as wavelength, frequency, use, and hazards and recognize its application to an understanding of planetary images and satellite photographs.
SC.8.E.5.12:	Summarize the effects of space exploration on the economy and culture of Florida.
SC.8.N.1.2:	Design and conduct a study using repeated trials and replication.
SC.8.N.1.3:	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.
SC.8.N.1.4:	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.
50 0 N 1 (Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of
SC.8.N.1.6:	imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
SC.8.N.2.1:	Distinguish between scientific and pseudoscientific ideas.
SC.8.N.2.2:	Discuss what characterizes science and its methods.
SC.8.N.3.1:	Select models useful in relating the results of their own investigations.

SC.8.N.3.2:	Explain why theories may be modified but are rarely discarded.
SC.8.N.4.1:	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.
SC.8.N.4.2:	Explain how political, social, and economic concerns can affect science, and vice versa.
MAFS.6.EE.3.9:	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.
MAFS.6.SP.1.1:	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.
MAFS.6.SP.1.2:	Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
MAFS.6.SP.1.3:	Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.
MAFS.6.SP.2.4:	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
MAFS.6.SP.2.5:	 Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.
MAFS.7.SP.1.1:	Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.
MAFS.8.F.2.5:	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
MAFS.8.SP.1.2:	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.
MAFS.K12.MP.1.1:	Make sense of problems and persevere in solving them. Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Construct viable arguments and critique the reasoning of others.
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Model with mathematics.
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Use appropriate tools strategically.
	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper.

MAFS.K12.MP.5.1:	concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.68.RST.1.3:	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LAFS.68.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.
LAFS.68.RST.2.5:	Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.
LAFS.68.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
LAFS.68.RST.3.7:	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LAFS.68.RST.3.8:	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
LAFS.68.RST.3.9:	the same topic.
LAFS.68.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports the argument presented.
LAFS.68.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples. c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to inform about or explain the topic. e. Establish and maintain a formal style and objective tone. f. Provide a concluding statement or section that follows from and supports the information or explanation presented.
LAFS.68.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.68.WHST.2.5:	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
LAFS.68.WHST.2.6:	Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.
LAFS.68.WHST.3.7:	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
LAFS.68.WHST.3.8:	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
LAFS.68.WHST.3.9:	Draw evidence from informational texts to support analysis reflection, and research.

GENERAL NOTES

If this course is to be used in a STEM sequence in place of either the comprehensive or subject specific course sequences, teachers should refer to the test item specifications for the 8th grade SSA for information on tested standards which can be found at: https://www.fldoe.org/core/fileparse.php/5663/urlt/swsatisG8.pdf.

This course is an integrated Science, Technology, Engineering and Mathematics (STEM) course for middle school students. M/J STEM Physical Science includes an integration of standards from science, mathematics, and english/language arts (ELA) through the application to STEM problem solving using physical science knowledge and science and engineering practices. Physical sciences through applications such as aeronautics, robotics, rocketry, mechanical, electrical, and civil engineering, are emphasized in this course. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by other using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

ISTE Standards (http://www.iste.org/docs/pdfs20-14_ISTE_Standards-S_PDF.pdf) should be incorporated in many contexts throughout the course.

Course Standards

Use grade appropriate Nature of Science and Mathematics Content (MAFS) benchmarks (i.e., if this course is offered to seventh grade students, then the SC.7.N benchmarks should be integrated into the course content, and SC.6.N and SC.8.N benchmarks should be omitted from the seventh grade course).

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The course also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

Additional Instructional Resources:

A.V.E. for Success Collection: http://www.fasa.net/4DCGI/cms/review.html?Action=CMS_Document&DocID=139

Course Number: 2001025

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: Earth/Space Sciences > Abbreviated Title: M/J STEM ASTRO/SPACE Course Length: Year (Y) Course Attributes:

Class Size Core Required

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 6,7,8

Educator Certifications

Chemistry (Grades 6-12)
Physics (Grades 6-12)
Earth/Space Science (Grades 6-12)
Middle Grades Integrated Curriculum (Middle Grades 5-9)
Middle Grades General Science (Middle Grades 5-9)

M/J STEM Astronomy and Space Science (#2001025) 2022 - And Beyond

Name	Description
SC.6.E.7.9:	Describe how the composition and structure of the atmosphere protects life and insulates the planet.
SC.6.N.1.2:	Explain why scientific investigations should be replicable.
SC.6.N.1.3:	Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.
SC.6.N.1.4:	Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.
SC.6.N.1.5:	Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.
SC.6.N.2.1:	Distinguish science from other activities involving thought.
SC.6.N.2.2:	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.
SC 4 N 2 2	Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests,
30.0.11.2.3.	and goals.
SC.6.N.3.1:	Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.
SC.6.N.3.2:	Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.
SC.6.N.3.3:	Give several examples of scientific laws.
SC.6.N.3.4:	Identify the role of models in the context of the sixth grade science benchmarks.
SC.7.N.1.2:	Differentiate replication (by others) from repetition (multiple trials).
	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and
30.7.N.1.3.	explain that not all scientific knowledge is derived from experimentation.
SC.7.N.1.4:	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.
SC.7.N.1.5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.
SC.7.N.1.6:	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.
SC.7.N.1.7:	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.
SC.7.N.2.1:	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.
SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.
SC.7.N.3.2:	Identify the benefits and limitations of the use of scientific models.
SC.8.E.5.1:	Recognize that there are enormous distances between objects in space and apply our knowledge of light and space travel to understand this distance.
SC.8.E.5.2:	Recognize that the universe contains many billions of galaxies and that each galaxy contains many billions of stars.
SC.8.E.5.3:	Distinguish the hierarchical relationships between planets and other astronomical bodies relative to solar system, galaxy, and universe, including distance, size, and composition.
SC.8.E.5.4:	Explore the Law of Universal Gravitation by explaining the role that gravity plays in the formation of planets, stars, and solar systems and in determining their motions.
SC.8.E.5.5:	Describe and classify specific physical properties of stars: apparent magnitude (brightness), temperature (color), size, and luminosity (absolute brightness).
SC.8.E.5.6:	Create models of solar properties including: rotation, structure of the Sun, convection, sunspots, solar flares, and prominences.
SC.8.E.5.7:	Compare and contrast the properties of objects in the Solar System including the Sun, planets, and moons to those of Earth, such as gravitational force, distance from the Sun, speed, movement, temperature, and atmospheric conditions.
SC.8.E.5.8:	Compare various historical models of the Solar System, including geocentric and heliocentric.
	Explain the impact of objects in space on each other including:
SC.8.E.5.9:	1. the Sun on the Earth including seasons and gravitational attraction
	2. the Moon on the Earth, including phases, tides, and eclipses, and the relative position of each body.
	Assess how technology is assential to science for such purposes as assess to outer space and other remote locations, sample collection
SC.8.E.5.10:	measurement, data collection and storage, computation, and communication of information
SC.8.E.5.11:	Identify and compare characteristics of the electromagnetic spectrum such as wavelength, frequency, use, and hazards and recognize its application to an understanding of planetary images and satellite photographs.
SC.8.F.5.12:	Summarize the effects of space exploration on the economy and culture of Florida.
SC.8.N.1.2:	Design and conduct a study using repeated trials and replication.
SC.8.N.1.3:	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.
SC.8.N.1.4:	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.
	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of
SC.8.N.1.6:	imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
SC.8.N.2.1:	Distinguish between scientific and pseudoscientific ideas.
SC.8.N.2.2:	Discuss what characterizes science and its methods.
SC.8.N.3.1:	Select models useful in relating the results of their own investigations.
1	

52.88.4.3 Explosite solutions on or of the processes that can be add to inform disider making at the community, state, makinal and international levels. 52.88.4.5 Mail restantions of the processes that can be add to inform disider add to	SC.8.N.3.2:	Explain why theories may be modified but are rarely discarded.
55.84.12 Equal hospital code: and elevantic corrents or lifety science, and skewsta. We Materialization with only that industry many balance and provide a science of the science of	SC.8.N.4.1:	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.
Automaticans are perfected in alterial using onto induktably and with chares Autopic ministry and induced in alterial using onto induktably and with chares Autopic ministry and induced in alterial using onto induktably and with chares Autopic ministry and induced induced in alterial using onto induktably and with chares Autopic ministry and induced induce	SC.8.N.4.2:	Explain how political, social, and economic concerns can affect science, and vice versa.
Available to a blain the induction for blain. Available to a blain the induction in provide a software software on the softwa		Mathematicians who participate in effortful learning both individually and with others:
MARED MILLION A enclosulation to the function of the function of the procession of the p		Analyze the problem in a way that makes sense given the task.
AMAGE 2007.11 Provide program and the product method or them were they as specification. Provide a promote the order attempting in resemented or approach. Provide a promote the order attempting in the method benefits order attempting. Provide a promote the order attempting in the method benefits order attempting. Provide a promote the order attempting in the method benefits order attempting in the method. Provide attempting in the order attempting in the method benefits order attempting in the method. Provide attempting in the order attempting in the method. Provide attempting in the order attempting in the method. Provide attempting in the order attemptin		 Ask questions that will help with solving the task. Build perseverance by modifying methods as peeded while solving a challenging task.
AMAGED AND TO THE ADDRESS OF ADDRES		 Stavengaged and maintain a positive mindset when working to solve tasks.
MARKIZ MTR.11: Under State Sta		Help and support each other when attempting a new method or approach.
Action Interference and a contraction of contributed actions: 	MA.K12.MTR.1.1:	Clarifications:
A. Collision a community of gooth middel teams. B. Note province in students by cooking table ang problem. B. Note province in students by cooking table ang problem. B. Note and the students of anti-match shading by representing problems in multiple ways. B. Note and the students of anti-match shading by representing problems in multiple ways. B. Note and the students of anti-match shading by representing problems. B. Notes connections between concepts and prosecutions in multiple ways. B. Notes connections between concepts and prosecutions. B. Socies connections between concepts and prosecontext. B. Socies co		Teachers who encourage students to participate actively in effortful learning both individually and with others:
 		Cultivate a community of growth mindset learners.
Peerleg students and you advalue		Foster perseverance in students by choosing tasks that are challenging.
• tesquire durations status consists and your status grant proteins were. • Demonstrate understanding type representing proteins in multiple ways: • Mainternitions who demonstrate understanding by representing proteins in multiple ways: • Address and proteins in multiple ways using object of waining, table, graphs and equations. • Propries is non-consent proteins in multiple ways using object of waining, table, graphs and equations. • Propries is non-consent proteins in multiple ways using object of waining, table, graphs and equations. • Propries consent in the grant context of propries was using object in the grant context of propries. • Christianini • Contract context is understanding by representing produces in multiple ways: • Problem protunting be statistics is one monipulative when meeting the grant propries. • Contract context is understanding by representing context is understanding by representing produces in the dynamic context. • Maintain floating and anzympropries with in problem within the grant context. • Maintain floating and anzympropries with in problem within the grant context. • Maintain floating and anzympropries with expect and context. • Maintain floating and anzympropries with inperforming colculations. • Complete lacks with mathematical floating. • Problem protect in the status context is understanding dor expections. • Context is protect in the status of the prot		Develop students' ability to analyze and problem solve.
Automatical understanding by representing problems in multiple ways: Automatical understanding by representing problems in multiple ways: Automatical understanding problems in multiple ways: Automatical understanding problems with rejection understanding by representing problems in multiple ways: Automatical understanding problems with rejection understanding by representing problems in multiple ways: Automatical understanding problems with rejection understanding by representing problems in multiple ways: Automatical understanding problems with rejection understanding by representing problems in multiple ways: Automatical understanding problems in the problem in the problems in multiple ways: Automatical understanding problems in the problem in the problems in multiple ways: Automatical understanding problems in the problem in problems within the gloen compact. Automatical understanding problems in the problem is problems within the gloen compact. Automatical understanding problems within a problems within the gloen compact. Automatical understanding problems within the problems within the gloen context. Automatical understanding problems within the gloen context is a societ within the gloen context. Automatical understanding problems within the problems within the gloen context is a societ within the soc		Recognize students effort when solving challenging problems.
AMARING MINISTERS Provide induction of the outprovide inpart of information of the outprovide information of t		Demonstrate understanding by representing problems in multiple ways.
A. K12.MIR.21 Bell during through modeling quicking states: graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Progress from modeling problems with objects and drawing to using algorithms and equations. Progress from modeling problems with objects and drawing to using algorithms and equations. Progress from modeling problems with objects and drawing to using algorithms and equations. Progress from modeling problems with objects on purpose. Constraints between complex and the progress relations. Provide opportunities for students to use monipulative when investigating compets. Provide opportunities for students to use monipulative when investigating compets. Provide adports from common students on use understanding progressors. Soles durates that various regresentations. Provide adports to adport when the students on use understanding progressors. Soles durates that various regressor tables. Provide adport when the advance of the students on the advance of the students. Complete tasks with mathematical fluency. Marking to advance with the fluency when performing adulations. Provide advances to advance to the performing adulations. Provide advances to the retreatest of enderstander and enderstanders from and ender advances there advances with the students on the advances to the students on the advances to the students on the enderstanders of the advances there advances there advances there advances the enderstanders of the advances there advances to the students on the advances to the enderstander there advances to the students advance to the enderstandetad fluency. Provide advance		mathematicians who demonstrate understanding by representing problems in multiple ways:
AKA22 MTR21 • Express connections to problems in nulpide ways using polety, gravita and equations. • Programs from modeling problems with objects and drawings to using apprintma and equations. • Express connections between concepts and representations. • Express connections between concepts and representations. • Express connections between concepts and representations. • Fractions the concentration of the purpose. • Express connections between concepts and representations. • Fractions the concentration between concepts and representations. • Fractions the concentration between concepts and representations. • Fractions the concentration between concepts and representations. • Fractions the concentration between concepts and representations. • Fractions the concentration between concepts and representations. • Fractions the concentration of the problems in multiple ways. • Fractions the concentration between concepts and representations. • Select attains the complete tasks with mathematical fluency. • Select attains the complete tasks with mathematical fluency. • Select attains the concentration performing produms within the given context. • Express devices to select the concentration of purpose and concentrations. • Express devices to representations. • Express devices to select the concentration of purpose. • Express devices to representations. • Express devices to select the representation of purpose and concentration. • Express device		Build understanding through modeling and using manipulatives.
MAR12 MIR2.1 • Orgense throm modeling indexines and argumption to using algorithm and equations. • Express or intentions between concengist and representations. • Choose a representation task of the indexing by representing propilems in multiple ways. • I leps duality in the concentric bardween concentrate understanding by representing propilems in multiple ways. • I leps duality indexing the concentrate understanding by representing propilems. • I leps duality indexing the concentrate understanding by representing propilems. • Structure in the concentrate understanding by representing propilems. • I leps duality index on the concentrate understanding by representing propilems. • Structure indexing indexing the concentrate understanding progresses. • Shew statement that warbus representations can have different purposes and can be useful in different statements. • Complete tasks with mathematical fluency: • Shew statements that warbus representations can have different purposes and can be useful in different statements. • Complete tasks with mathematical fluency: • Shew statements that any threm to a new context. • Marian fluobility optimities or statements to complete tasks with mathematical fluency: • Tradees with the floobility to solve problems by wheering a procedure that allows them to solve efficiently and accurately. • Foreide students with the floobility to solve problems by there in a more difficient of and others. • Name influe populations with the floobility to solve problems by steaconstante index of solve and others. •		Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
AMAX12.MTR2.1: Exploses for induction between complex and regression logical solutions. Exploses and complex inductions between complex and regression logical solutions. Field is understanding by regression logical solutions. Complete tasks with mathematical fluency: Select afficient and appropriate nethods for to camplex and can be useful in different situations. Complete tasks accurately and with confidence. Complete tasks accurately and with confidence. Complete tasks accurately and with confidence. Select afficient and appropriate nethods for to axing problems within the given context. Mark12.MTR3.1: Explose in discussions that reflect on the mathematical fluency: Field is understanding or prove afficiency when performing calculations. Complete tasks accurately and accurately. Field is understanding in discussions that reflect on the mathematical fluency: Field is understanding in discussions that reflect on the mathematical fluency. Field is understanding in discussions that reflect on the mathematical fluency is understanding prove afficiency with the select solutions. Communicatin mathematical fluency is understanding prove affici and others:<td></td><td> Progress from modeling problems with objects and drawings to using algorithms and equations. Eveness connections between concents and representations. </td>		 Progress from modeling problems with objects and drawings to using algorithms and equations. Eveness connections between concents and representations.
MARK12 MIR 41 Obsolution theorem on the period of the period MARK12 MIR 41 Classifications: Teachers who encourage students to demonstrate uperiod on the period Provide opportunities for students to use manuful they when investigating processes. • House opportunities for students to use manuful they when investigating processes. • Strew students that various representations can new different purposes and can be useful in different situations. • Strew students that various representations can new different purposes and can be useful in different situations. • Strew students that various expresentations can new different purposes. • Mark 11 • Strew students that opportune methods to studing problems within the given cantest. • Mark 11 • Strew students that opportune methods to studing problems within the given cantest. • Mark 12 MIR 31: • Strew students to complete tasks accurately and with continence. • Use feedoads to improve efficiency when performing calculations. • Complete tasks accurately and with the trackilly to solve problems by solecing a procedure that allows them to solve afficiently and accurately. • Devide apport number of a student to context with mathematical thinking of statest. • Provide apport number of a method to the mathematical thinking of statest. • Provide apport number of a method to the mathematical thinking of statest. • Provide apport number of a method to the mathematical thinking of statest. • Provide apportrunities for st	MA K12 MTR 2 1.	Choose a representation based on the given context or purpose
MARINE WILD enclose who encourage students to demonstrate understanding by representing problems in multiple ways: Help students multiple valuents to understanding by representing problems in multiple ways: Provide opportunities for students to understanding progresses. Structure students that water connections between concepts and representations: Structure students that water connections to between concepts and representations. Structure students that water connections between concepts and representations. Structure students that water connections to the stature representations. Structure students that water constructure is the stature of the statur	MA.N12.WITN.2.1.	
AMAKI2MTR-11 High students reade connections to between concepts and regresentations: Cuide students from concrete to pictorial is abitrard regresentations as under standing progresses. Show students that various regresentations can have different purposes, and can be useful in different students? Markit2MTR-11 Select efficient and appropriate methods for solving producess and can be useful in different students? Select efficient and appropriate methods for solving producess within the forming procedures and mentil calculations. Select efficient and appropriate methods for solving producess and can be useful in different students? Markit2MTR-11 Select efficient and appropriate methods for solving producess and can be useful in different students? Markit2MTR-11 Select efficient and appropriate methods for solving producess and producess to approach the tapping them to nave context. Markit2MTR-11 Use feedback to improve efficiency when performing calculations. Markit2MTR-11 Transhes who encourage students to complete tasks with mathematical fluoncy. Provide students from courage students to complete tasks with mathematical fluoncy. Provide capotrunities for students to rescue the fluon the mathematical fluoncy. Markit2MTR-11 Transhes who encourage students to complete tasks with mathematical fluoncy. Provide capotrunities for students to regrese that and others: Communicate mathematical ideas, vocabulizy and methods effectively. Markit2MTR-11 Transhes who encourage students that approprinte methods effectively. Markit2MTR-11 Transhes who encour		Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:
AMART2.MTR.3.1 Provide opportunities for students to use manipulatives when investigating concepts. Show students that various representations can have different purposes and can be useful in different situations. Complete tasks with mathematical fluency. Mathematical students from concepts the staks with mathematical fluency. Select difficient and appropriate methods for solving problems within the given context. Maintain fluctuations who complete tasks with mathematical fluency. Complete lasks action from any context. Maintain fluctuations to apply them to a new context. Mathematical fluency. Provide opportunities for students to complete tasks with mathematical fluency. Provide opportunities for students to complete tasks with mathematical fluency. Provide opportunities for students to complete tasks with mathematical fluency. Provide opportunities for students to complete tasks with mathematical fluency. Provide opportunities for students to provide the static students. Offer multiple opportunities for students to provide afficient and generalizable methods. Provide opportunities for students to provide students and the students of students and students. Analyze the mathematical thinking of self and others. Compare the additional provides and process. Complete the students to down any gene in discussions that reflect on the mathematical thinking of self and others: Recorptice errors and student was to downs. Compare the addition of an antodo to the sequence of the secure students. Compare the addition of a method to those expressed by others: Secorptice e		Help students make connections between concepts and representations.
 Cuide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations. Complete tasks with mathematical fluoncy. Mathematicians who complete tasks with mathematical fluoncy. Mathematicians who complete tasks with mathematical fluoncy. Mathematicians who complete tasks excurately and with confidence. Adapt produces to apply them to a new context. Mathematicians who encourage students to complete tasks with mathematical fluency. Horida students with the flexibility of produces and mental calculations. Complete tasks excurately and with confidence. Adapt produces to apply them to a new context. Use flexibility and sproper difficiency when performing calculations. Teachens with the flexibility is obve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for situations to practice officient and generalizable methods. Provide students that reflect on the mathematical fluency. Analyze the mathematical lideas, vacabulary and methods effectively. Analyze the mathematical thicking of solf and others: Communicate mathematical thicking of others. Construct possible arguments based on evidence. Select sequence and present students to incurso thein thinking of self and others: Select sequence an		Provide opportunities for students to use manipulatives when investigating concepts.
 Show students that various representations can have different purposes and can be useful in different situations. Komplete tasks with mathematical fluency. Komplete tasks with mathematical fluency. Komplete tasks and mathematical fluency. Komplete tasks and mathematical fluency. Komplete tasks accurately and with confidence. Komplete tasks accurately and with the float bill by to solve problems. Foolde students to increase fluence performing cancellately and generalizable methods. Foolde students to increase fluence there and generalizable methods. Foolde students of reflect on the mathematical fluency:		Guide students from concrete to pictorial to abstract representations as understanding progresses.
MARK12.MTR.4: Complete tasks with mathematical fluency: MARK12.MTR.3: Select efficient and appropriate methods for solving problems within the given context. MARK12.MTR.3: Mathematicians who complete tasks swith mathematical fluency: MARK12.MTR.3: Complete tasks complete tasks such accuracy while performing procedures and mental calculations. MARK12.MTR.3: Complete tasks complete tasks complete tasks with mathematical fluency: MARK12.MTR.3: Taschers who encourage students to complete tasks with mathematical fluency: MARK12.MTR.3: Forded caportunities for students to complete tasks with mathematical fluency: MARK12.MTR.4: Taschers who encourage students to complete tasks with mathematical fluency: MARK12.MTR.4: Forded caportunities for students to reflect on the mathematical fluency: MARK12.MTR.4: Communicate mathematical fluency and methods effectively. MARK12.MTR.4: Compare the efficiency of a method to those expressed by others. MARK12.MTR.4: Compare the efficiency of a method to those expressed by others. MARK12.MTR.4: Compare the efficiency of a method to those expressed by others. MARK12.MTR.4: Testhers who encourage students to capse in discussions that reflect on the mathematical thinking of self and others: MARK12.MTR.4: Testhers who encourage students as questions of the tasks.		Show students that various representations can have different purposes and can be useful in different situations.
Mathematicians who complete tasks with mathematical functy: AAK12.MTR.3: WAK12.MTR.3: WAK12.MTR.4:		Complete tasks with mathematical fluency.
Action Select efficient and appropriate methods for solving problems within the given context. MALK12.MTR.3.1 Maintain flexibility and accuracy while performing procedures and mental calculations. Addspt procedures to apply them to a new context. Use freedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with methematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficientiy and accurately. Offer multiple opportunities for students to practice efficient and queneralizable methods. Provide students with reflection the mathematical thinking of self and others: Compare the efficiency of a method to those expressed by others. Compare the efficiency of a method to those expressed by others. Compare the efficiency of a method to those expressed by others. Compare the efficiency of a method to those expressed by others. Compare the efficiency of a method to those expressed by others. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to erade and evidence. Clarifications: Teachers who encourage students to enging in discussions that reflect on the mathematical thinking of self and others: Select. sequence and present sto discuss their thinking with peers.		Mathematicians who complete tasks with mathematical fluency:
 Maintain flocibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Carifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately, 0. Offer multiple opportunities for students to reflect on the mathematical thinking of self and others: Provide students with the flexibility of othes: occasion of the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical floads, vocabulary and methods effectively. Analyze the mathematical thinking of others: Communicate mathematical thinking of others: Communicate mathematical thinking of others: Communicate mathematical thinking of these expressed by others: Stuff results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Eachers who user present students to engage in discussions that reflect on the mathematical thinking of self and others: Crastic possible and processes. Construct possible and present students with to advective and depen understanding of correct and increasingly efficient methods: Develop students' ability to justify methods and connect mathematical concepts. Exclusion accurate to tolgically order events, steps or ideas to solve problems. Develop		Select efficient and appropriate methods for solving problems within the given context.
ACCOMPLETE Last as accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Charifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide apportunities for students to reflect on the mathematical thinking of self and others: Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical tables, vocabulary and methods effectively. Analyze the mathematical tables and others: Communicate mathematical tables of others. Construct possible arguments based on evidence: Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Construct possible arguments based on evidence: Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Construct possible arguments based on evidence: Clarifications: Teachers who encourage students to engage in discussions that refle		Maintain flexibility and accuracy while performing procedures and mental calculations.
MAK12.MTR.3.1: Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Intrincations: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the feedback to solve problems by selecting approcedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used. Provide students who engage in discussions that reflect on the mathematical fluency: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical ideas, vocabulary and methods effectively. Analyze the mathematical ideas, vocabulary and methods effectively. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. User results or early and processes. Construct possible arguments based on evidence. Clarifications: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Establish a culture to help understand and connect mathematical concepts. Bevelop students' ability to justify methods and connect mathematical concepts. Else provide sign and processures to logically ordre events, steps or i deas to solve problems.		Complete tasks accurately and with confidence.
Use feedback to improve efficiency when performing calculations. Charifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to practice efficient and generalizable methods. Communicate mathematical diags. vocabulary and methods effectively. Analyze the mathematical diags. vocabulary and methods effectively. Analyze the mathematical diags. vocabulary and methods efficiently of a method to thoree sequessed by others. Compare the efficiency of a method to to correctly solve the task. Austify results by explaining methods and processes. Construct possible arguments based on evidence. Charifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.	MA K12 MTR 3 1	Adapt procedures to apply them to a new context.
Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the mathematical methods. Provide opportunities for students to reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical likes, vocabulary and methods effectively. Analyze the mathematical likes, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Listify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Stablish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and connect mathematical concepts. Focus on relevant detalis within a problem. Cre	NIX.1(12.10111(.0.1)	Use feedback to improve efficiency when performing calculations.
Tackers who encourage students to complete tasks with mathematical fluency: Provide students with the flickibility to solve problems by selecting and procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide students who engage in discussions that reflect on the method they used and determine if a more efficient method could have been used. MAK12.MTR.4.1: Communicate mathematical linking of self and others: Communicate mathematical linking of self and others: Communicate mathematical thinking of self and others: Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Lustify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to nagae in discussions that reflect on the mathematical thinking of self and others: Scatabilsh a culture in which students as questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and connect mathematical concepts. Rathematicans who use patterns and structure to help understand and connect mathematical concep		Clarifications:
 A row is subartised within the nexturnity to synchronic by Seaching a processing a		Teachers who encourage students to complete tasks with mathematical fluency:
MARK12 MTR.1: Provide opportunities for situation to produce the used and determine if a more efficient method could have been used. MARK12 MTR.4: Engage in discussions that reflect on the mathematical thinking of self and others: Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical diveas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Compare the efficiency of a method to those expressed by others. • Construct possible arguments based on evidence. • Construct possible arguments based on evidence. Clarifications: • Construct possible arguments based on evidence. Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student to discuss their thinking with peers. • Select, sequence and present student to engage in discussions that reflect on the mathematical concepts. Mathematicicans who use patterns and structure to help understand and connect mathematical concepts. Mathematicicans who use patterns and structure to help understand and connect mathematical concepts. • Coreate opportunities for students to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated lar		 Offer multiple opportunities for students to practice efficient and generalizable methods.
MAK12 MTR.5.1: Engage in discussions that reflect on the mathematical thinking of self and others. MAK12 MTR.5.1: Communicate mathematical lideas, vocabulary and methods effectively. Analyze the mathematical linking of others. Compare the oefficiency of a method to those expressed by others. Compare the oefficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and connect mathematical concepts. Makt12.MTR.51: MAK12.MTR.51: MAK12.MTR.51:		 Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Lustify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts. Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Mark12.MTR.5.1: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: 		Engage in discussions that reflect on the mathematical thinking of self and others
MA.K12.MTR.4.1: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and connect mathematical concepts: Select, sequence and procedures to legically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. MAK12.MTR.5.1:		Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
MA.K12.MTR.4.1: Compare the efficiency of a method to those expressed by others. MA.K12.MTR.4.1: Compare the efficiency of a method to those expressed by others. MA.K12.MTR.4.1: Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Eachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers. Use patterns and structure to help understand and connect mathematical concepts: MA.K12.MTR.5.1: Focus on relevant details within a problem. Focus on relevant details with a problem. MA.K12.MTR.5.1: Evelop students to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Concen		Communicate mathematical ideas useabulary and methods offsetively
MA.K12.MTR.4.1: Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers. Select, sequence and present structure to help understand and connect mathematical concepts. MA.K12.MTR.5.1: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connact solutions of problems to more complicated large-scale situations. Concepts: Preschers who encourage students to use patterns and structure to help understand and connect mathematical concepts: MA.K12.MTR.5.1: Create plans and procedures to new concepts. Look for similarities among problems.		Analyze the mathematical thinking of others
 Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. 		Compare the efficiency of a method to those expressed by others.
MA.K12.MTR.4.1: Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers. MA.K12.MTR.5.1: Automaticians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. MA.K12.MTR.5.1: Clarifications: Connect solutions of problems to more complicated large-scale situations. Connect solutions of problems to more complicated large-scale situations. Clarifications: Help students recognize the patterns in the world a		Recognize errors and suggest how to correctly solve the task.
MARTERNIE • Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers. Mathematicians who use patterns and structure to help understand and connect mathematical concepts. • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Help students to develop generalizations based on the similarities found among problems.		Justify results by explaining methods and processes.
Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers. Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect mathematical concepts.	IVIA.K12.MTR.4.1:	Construct possible arguments based on evidence.
MA.K12.MTR.5.1: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers. Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect mathematical concepts. Support students to develop generalizations based on the similarities found among problems. 		Clarifications:
 Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers. Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. 		Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:
 We have a problem to indentis to iscues their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers. Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. 		Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.
 Better, sequence and precent student work to detraite and deeperformation of correct and net datagety embeds. Develop students' ability to justify methods and compare their responses to the responses of their peers. Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect these patterns to mathematical concepts. Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. 		 Create opportunities for students to discuss their inniking with peers. Select sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.
 Mathematicians who use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. 		 Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1: MAthematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems.		Use patterns and structure to help understand and connect mathematical concents
 Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts. Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. 		Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
 Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts. Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. 		Focus on relevant details within a problem
 Decompose a complex problem into manageable parts. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. 		 rocus on relevant details within a problem. Create plans and procedures to logically order events, stans or ideas to solve problems.
 Relate previously learned concepts to new concepts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems.	MA.K12.MTR.5.1:	Decompose a complex problem into manageable parts
 MA.K12.MTR.5.1: Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. 		Relate previously learned concepts to new concepts.
 MA.K12.MTR.5.1: Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. 		Look for similarities among problems.
 Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. 		Connect solutions of problems to more complicated large-scale situations.
 Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. 		Clarifications:
 Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. 		Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:
Support students to develop generalizations based on the similarities found among problems.		Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
		Support students to develop generalizations based on the similarities found among problems.

Access the conservations of values. Access the conservations of values of v		 Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
EVALUATION IN Evaluation to compare problem solutions: EVALUATION IN Evaluation to compare problem solutions: EVALUATION IN Evaluation compare problem solutions: EVALUATION IN Evaluation compare problem solutions: EVALUATION IN Evaluation compare problem solutions: Evaluation compare students to assess the reasonableness of solutions: Evaluations: Evaluation compare students to assess the reasonableness of solutions: Evaluations: Evaluation compare students to assess the reasonableness of solutions: Evaluations: Evaluation compare students to assess the reasonableness of solutions: Evaluations: Evaluation compare students to assess the reasonableness of solutions: Evaluations: Evaluation compare students to reasonable controls: Evaluation compare students to assess the reasonableness of solutions: Evaluation compare students to assess the reasonableness of solutions: Evaluation compare students to assess the reasonableness of solutions: Evaluation compare students to assess the reasonableness of solutions: Evaluations: Evaluation compare students to assess the reasonableness of solutions: Evaluations: Evaluation compare students to assess the reasonableness of solutions: Evaluation: Evaluation compare student		Assess the reasonableness of solutions.
Performance of the second problem is a source masks some. Performance of the second problem is a source masks some. Performance of the second problem is a source masks some. Performance of the second problem is a source masks some. Performance of the second problem is a source masks some. Performance of the second problem is a source mask some. Performance of the second problem is a source mask some. Performance of the second problem is a source mask some. Performance of the second problem is a source mask some. Performance of the second problem is a source mask some. Performance of the second problem is a source mask some. Performance of the second problem is a source mask some. Performance of the second problem is a source mask some. Performance of the second problem is a source mask some. Performance of the second problem is a source mask some. Performance of the second problem is a source mask some. Performance of the second problem is a source of the second problem is a s		Mathematicians who assess the reasonableness of solutions:
Even contract or setting in the set of the provide set of the pro		Estimate to discover possible solutions.
Part of a constraint of a method a constraint of a constraint of a method a constraint. Note a constraint of a method a method is to real world o constraint. Note a method and method a to under constraint of a method a constraint. Note a method and method a to under constraint of a method is a paper parameter. I how method and method a to under constraint of a method is a paper parameter and a taking, and effort method is a paper parameter and a constraint. I how method and method a to under constraint of a method is a paper parameter and a constraint. I how method a method a method is to under constraint of a method is a paper parameter and a taking. I how constraints a the walking constraints on the parameter and a taking and effort in inscission in the water and a method is a method. E A method a method is the and a method is a method		Use benchmark quantities to determine if a solution makes sense.
ANA K12 AFTR 2.1 A scalar in read to based on the given register. Examination with tradem to accuss the incompositions of statulants. How to accuss the incomposition of the given register. How to accuss the incomposition of the given register. A scalar in read to based the incomposition of the given register. A scalar in read to based the incomposition of the given register. A scalar in read to based the incomposition of the given register. A scalar in read to based the incomposition of the given register. A scalar incomposition of the given regiven register. A scalare		 Cneck calculations when solving problems. Verify possible solutions by explaining the methods used
CLARAGE Example of the intervention of t	MA.K12.MTR.6.1:	 Evaluate results based on the given context.
Electron who encourage subcents to assess the reasonablenes of subditions Interstubions is enclosed in a subdition in a substance in the substance in a substance. In the subdities is enclosed in the substance in the substance in a substance. Interstubions down hit interstubions down hit interstubions. Apply methanics is non-advanted in the substance in the substance. Interstubions down hit interstubions down hit interstubions. Apply methanics is non-advanted interstubion operation and substance. Interstubions down interstubions down interstubions. Interstubions. Internet down and methans is an advanted substance. Interstubions. Internet down and methans is an advanted substance. Interstubions. Internet down and methans is an advanted substance. Interstubions. Interform investigations to pather down and substance. Interform investigations. Interform investigations. Interform investigations.		Clarifications:
Part of the standard starting of product do lucing hor to solving. Prompt starting control is update the control with the vark is an the programs within and dreat as is. Starting the standard dailing variants and variants and variants. Apply maternalistics for all-variants (and within your solution more starting variants). Apply maternalistics for all-variants (and within your solution more starting variants). Apply maternalistics for all-variants (and within your solution more starting variants). Apply maternalistics for all-variants (and within your solution more starting variants). Apply maternalistics for all-variants (and within your solution more starting variants). Apply maternalistics for all-variants (and within your solution within your solution within your solution within your solution). Apply maternalized within the starting of the solution of the solution of the product of the solution of the solution		Teachers who encourage students to assess the reasonableness of solutions:
Examples in the subter the state is they progress with justifications. Strengthen student's billing to with youking the with justifications. Apply mathematics to real wind contexts. MAK 121 MIR 7.1 The information of the strength o		 Have students estimate or predict solutions prior to solving. Prompt students to continually ask "Does this solution make sense? How do you know?"
e. Strengthen students? additing to verify solutions through justifications. Apply mechanisms to neal work inventes: https://mitigations. Apply mechanisms to neal work inventes: https://mitigations. APPLY inventements to real work donates to real work donates to be one obles and methods to understand regression in doske problems. Perform investigations up apply mathematics to real-work donates to reflections? Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Perform investigations. • Provide apportunities to real-work and statistic, and partor investigations. • Devide apportunities to real-work and statistic, and partor investigations. • Devide apportunities to real-work and statistic, and partor investigations. • Devide apportunities to real-work and statistic, and partor investigations. • Devide apportunities to real-work and statistic, and partor investigations. • Devide apport students to accuracy of the models and the data and partor investigations. • Devide apportunities investigations. • Devide apportunities to real-work and statistic to real-work and statistic to real-work and statistic. • Devide apportunities investigations. • Devide apportunities to real-work and statistic to real-work and statistic to real-work and statistic. • Devide apportunities investigations. • Devide apportunities in the control to information work provide work and apportunities. • Devide apportunities. • Devide apportunities interves and the interves and statistic to real		Reinforce that students check their work as they progress within and after a task.
Approximatements to real-world contexts. Watementations work approximation to real-world contexts. • Connect mathematical concepts to everyday experience. • Is models and methods to appth methods to appendix and solve problems. • Definition in weighter to appth disc or determine if a method is appropriate. • Definition in weighter to appth disc or determine if a method is appropriate. • Definition in weighter to appth disc or determine if a method is appropriate. • Definition in weighter to appth disc or determine if a method is appropriate. • Support traiters for submit disc or determine if a method is appropriate. • Definition in weighter to appth appth methods to be averyday experiments. • Definition in weighter to appth and prefyrition appth in models and methods. • Support traiters for submit disc ordering appth appth methods to appendix the set submit is appropriate. • Definition in weighter to appth and prefyrition appth in the set of appropriate. • Definition in appth in the set of application application of the disc ordering in the set of application application of the set of application application application application application. • Definition in application application. • ELAKT2EL2.1. The inflamition in the set of application		Strengthen students' ability to verify solutions through justifications.
Control mathematical concepts of a service properties is a service of a service problems. Control mathematical concepts to every experiments. Control mathematical concepts to every every experiments. Control mathematical concepts to every every experiments. Control mathematical concepts to every ev		Apply mathematics to real-world contexts.
• Example in endodes and methods by provide upperformance. • Use models and methods by and methods is proprieted. • Reform investigations to gather data or determine if a method is appropriate. • Reform investigations to gather data or determine if a method is appropriate. • Reform investigations to gather data or determine if a method is appropriate. • Refere in investigations to gather data or determine if a method is appropriate. • Refere in investigations to gather data or determine if a method is appropriate. • Refere in investigations to gather data or determine if a method is appropriate. • Refere in investigations to gather data or determine if a method is appropriate. • Notice apportunities for students to create models, both concrete and abstract, and perform investigations. • Indicate how various concepts can be applied in other disciplines. • Indicate how various concepts can be applied in other disciplines. • Indicate how various concepts can be applied in other disciplines. • Statemins function effect in the concept of the data indicate distance. • Indicate how various concepts can be applied on other disciplines. • Statemins function effect in the concept of the data indicate distance. • Indicate how various concepts can be applied on other disciplines. • Statemins continue with previous skills and function continuation. • Statemins continue with previous skills and		Connect mathematical concents to everyday experiences
AAA22MT271: Perform investigations to gather data or determine if a method is appropriate Redesign models and methods to improve accuracy or efficiency. Clarifications: Tradentrs who encourage students to apply mithematics to reak world contexts: Beneform investigations. Challenge students to question the accuracy of their modes, both contreat and assirted, and perform investigations. Challenge students to question the accuracy of their modes. Both contreat and assirted, and perform investigations. Challenge students to question the accuracy of their modes and methods. Subdents throw various concepts can be applied to other disciplines. Challenge students to question the accuracy of their modes and methods. Subdents include and justify reasoning. Charlenge students to question in their onal communication with guidance and support from adults. The evidence can consist of details from the icon theor withing and and a formation. Students should name the text when they refer to it. In 2rd grades, Students should and reference communication with guidance and support from adults. The evidence in their written and cail communication. Students include and when they refer to it. In 2rd grades, Students and the accuracy of details with use the form of dation dictated by the instruction or the style guides and there of assign and the assign and the assign and the assign and the assign within they differ. Proceedings of grade-level complexity bands and a text complexity rubro: Students is formed and stable and accuracy produced, students with an advest organized from adults. The service of stable with an advest organized from adults will happen based on the title page. Students and the assign and		 Use models and methods to understand, represent and solve problems.
Adk12MT7.1: efficiency. Classifications: Exercises who encourage students to apply mathematics to real-world contexts: Import students to question the accuracy of their models and methods. Support students is students to classify and contexts: Import students to question the accuracy of their models and methods. Chailenge students to question the accuracy of their models and methods. Import students to question the accuracy of their models and methods. Chailenge students to question the accuracy of their models and methods. Import students include instruction to short disciplines. Chailenge students include instruction with guidance and support from adults. The evidence can consist of details. From the text velocular interior student is exitable with and previous stills and communication documents with accuracies when they refer to it. In the dry prate, students include instructor common states of documents. ELAK12EE 1.1: Read and comprehend grade-level complex texts proficiently. Classifications: Sec for Complexity for grade-level complexity bands and a text complexity rubrit: Sec for Complexity for grade-level complexity bands and a text complexity rubrit: Sec apport accuracy of students when works infor or inforence or instructures. ELAK12EE 3.1: Classifications: Sec for Complexity for grade-level complexity the student with previous skills and use a style guide to create a proper classion. ELAK12EE 3.1: Classifications: Sec for Complexity for grade-lev		• Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or
Electrications: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Charge students to apply mathematics to real models. Such concrete and abstract, and perform investigations. Support students as they validate conductions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines. Che evidence to be applian and justify reasoning. Che evidence to applian and justify reasoning. Che evidence can consist of details from the fort without remains that and reference contensists of details from the fort without remains that and reference classics. Students continue with previous skills and reference classics. Students continue with previous skills and fuel reference classics. Students continue with previous skills and use of evisiting style guides to create a proper classicn. Students continue with previous skills and sub oble aware of existing style guides and the ways in which they differ: ELAK12 EE.11: Charifications: Students with meeting the students to use of the researce of the students will avere questions like "Wy is the gyrond increate to apport compresention digited-level complexity rubric. ELAK12 EE.21: Charifications:	MA.K12.MTR.7.1:	efficiency.
Electric Strict Barles Strict Stri		Clarifications:
e. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other despitnes. Cite evidence to explain and justify reasoning. Cite evidence to explain and justify reasoning. ELAK12.EF.1.1. PEAK12.EF.1.1. PEAK12.EF.1.1. Association of the evidence to the control of their or al communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students ideant of their or al communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students ideant of them their writing and cancemunication. Student's should name the text with net text with an they refer to it. In their writing and cancemunication. Student's should there the text when they refer to it. In their writing and cancemunication. ELAK12.EF.1.1. Association with previous skills and use a style guide to create a proper clatter. Association with previous skills and use a style guide to create a proper clatter. Diamination. ELAK12.EF.1.1. Make inferences to support comprehension. Diamination. Diamination. ELAK12.EF.1.1. Make inferences to support comprehension. Diamination. Diamination. ELAK12.EF.1.1.		 Provide opportunities for students to create models, both concrete and abstract, and perform investigations.
Support students as they validate conclusions by comparing them to the jewn situation. Indicate how various comparts and be applied to other disciplines. Cite evidence to explain and justify reasoning Clarifications: K-1 Students include textual evidence in their orial communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grads, students learn how to incorporate the evidence in their writing. 2-3 Students include relearn totatel evidence in their writing and orial communication. Students should name the text without perform to all communication. Students should area the text where they refer to it. In ard grade, students exhauld use a combination of direct and indirect clations. 4-3 Students continue with previous skills and reference comments made by speakers and peers. Students to they we directly quested, parphrased, or used for information. When writing, students will use the form of clation indicated by the instructor or the style guide referenced by the instructor. 6-4 Students continue with previous skills and fue as a style guide to create a proper clation. 9-1 2 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ: ELA K12 EE 3.1: Read and comprehension. ELA K12 EE 3.1: Clarifications: Students with represents support comprehension. ELA K12 EE 4.1: Clarifications: List when engaging in discussions in a variety of situations. ELA K12 EE 4.1: Clarifications: List when		Challenge students to question the accuracy of their models and methods.
Chartifications: Clarifications: Clarificatio		• Support students as they validate conclusions by comparing them to the given situation.
Cleardiance to explain and justif reasoning. Cleardiances: X1 Students include testual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the test without naming the test. During 1s grade, students learn how to incorporate the evidence in their writing. 23 Students include relevant testual evidence in their writine and oral communication. Students should name the test when they refer to it. In 3rd grade, students should use a combination of direct and indirect dations. 4.4 Students include relevant testual evidence in their writing at grade, students will use the form of citation dictated by the instructor or the style guide reference comments made by speakers and peers. Students on the style guide reference comments made by speakers and peers. 4.4 Students continue with previous skills and use a style guide to create a proper citation. 9.12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. ELAK12.EE.2.1: Clarifications: See Test Complexity for grade-level complexit tests proficiently. Clarifications: Students will nake inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the gird students will appen predictions about what will happen based on the title page. Students will answer questions like "Why is the gird students build upon these skills by justifying what they are thinking. For example: "think		Indicate how various concepts can be applied to other disciplines.
ELA K12 EE 1:1 Clarifications: ELA K12 EE 1:1: Read and comprehension. ELA K12 EE 1:1: Clarifications: ELA K12 EE 1:1: Read and comprehension. ELA K12 EE 1:1: Clarifications: ELA K12 EE 1:1: Read and comprehension. ELA K12 EE 1:1: Clarifications: ELA K12 EE 1:1: Read and comprehension. ELA K12 EE 1:1: Clarifications: ELA K12 EE 2:1: Clarifications: See Test Complexity bands and use a style guide to create a proper citation. -1:2 Students continue with previous skills and use a style guide to create a proper citation. ELA K12 EE 2:1: Clarifications: See Test Complexity bands and a test complexity rubric. ELA K12 EE 3:1: Students will make inferences to support comprehension. Clarifications: See Test Complexity bands and a test complexity rubric. ELA K12 EE 4:1: Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the git stylesing will want the guidem and test complexity		Cite evidence to explain and justify reasoning.
ELA.K12.EE.1.1: From the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. ELA.K12.EE.1.1: A:5 Students include release material weighted in their writing and and communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect situations. 4.4 Students continue with previous skills and reference comments made by speakers and geers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. e-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. See Text Complexity for grade-level complexity stands and a text complexity rubric. ELA.K12.EE.3.1: Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. ELA.K12.EE.3.1: Students informers before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling" or make predictions about what will happen based on the title page. Students will answer questions like "Why is the girl smiling" or make predictions and active listening skills when engaging in discussions in a variety of situations. ELA.K12.EE.4.1: Clarifications: In kindergarten, students learn to listen to one another respectfully.		K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details
2-3 Students include relevant textual evidence in their written and oral communications. 2-4 Students include relevant textual evidence in their written and oral communications. 2-4 Students include relevant textual evidence in their written and oral communications. 2-4 Students include relevant textual evidence in their written and oral communications. 2-4 Students include relevant textual evidence in their written and oral communications. 2-4 Students include relevant textual evidence in their written and oral communications. 2-4 Students include relevant textual evidence in their written and oral communications. 2-4 Students include relevant textual evidence in their written and oral communications. 2-4 Students include relevant textual evidence in their written and oral communications. 2-5 Students include relevant textual evidence in their written and oral communications. 2-4 Students include relevant textual evidence in their written and oral communications. 2-12 Students include relevant textual evidence in their written and oral communications. 2-12 Students include relevant textual evidence in their written and oral complexity rubric. 2-12 Students include relevant textual evidence in the words infor or inforence are introduced. Kindergarten students will answer questions like "Wry is the girl smilling" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. 2-12 Students build upon these skills by justifying what they are thi		from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.
ELA.K12:EE.1.1: A-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. A-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. ELA.K12:EE.2.1: Clarifications: See Text Complexity for grade-level complex texts proficiently. ELA.K12:EE.3.1: Clarifications: Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. ELA.K12:EE.3.1: Clarifications: Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. ELA.K12:EE.3.1: Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. ELA.K12:EE.1.1: Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. In kindergarten students build on these skills by justifying what they are thinking. For example: "1 think		2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
Proceeding of the instructor. Proceeding of the instructor or the style guide information. When writing, students will use the form of clation dictated by the instructor or the style guide inferences by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper clation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. ELA.K12.EE.2.1: Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. ELA.K12.EE.3.1: Make inferences to support comprehension. Clarifications: ELA.K12.EE.3.1: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the gif smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students bailt upon these skills by justifying what they are thinking. For example: "I think	ELA.K12.EE.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly
referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Lise appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Lise appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Lise appropriate collaborative techniques and active listening skills and counterclaims. In kindergarten, students learn to listen to one another respectfully. In kindergarten, students learn to listen to one another respectfully. In kindergarten, students learn to listen to one another respectfully. In kindergarten, students learn to listen to one another respectfully. In kindergarten, students learn to listen to one another respectfully.		quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide
be Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complexity spinse to texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the gri smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. ELA K12.EE.5.1: Students build on ideas, propel the conversation, and support claims and justifying their reasoning, refining and applying skills. Students will incorporate skills learned into work products to produce quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. Clarifications:		6.8 Students continue with previous skills and use a style guide to create a proper sitation
Read and comprehend grade-level complexitys proficiently. ELA K12.EE 2.1: Clarifications: See Test Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the gif smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. ELA K12.EE 3.1: Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. ELA K12.EE 4.1: Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work. ELA K12.EE 6.1: Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate scial and academic language to di		9-12 Students continue with previous skills and should be aware of existing style guide and the ways in which they differ.
ELA K12.EE.2.1: Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make Inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students build on ideas, propel the conversation discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence. ELA K12 EE 5.1: Use the accepted rules governing a specific format to create quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present i		Pood and comprohend grade level complex texts proficiently
See Text Complexity for grade-level complexity bands and a text complexity rubric. ELA.K12.EE.3.1: Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the gif smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In kindergarten, students learn to be oversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence. ELA.K12.EE.5.1: Use the accepted rules governing a specific format to create quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work. ELA.K12.EE.6.1: Use appropriate voice and tone when speaking or writing. Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends. LA.K12.EE.6.1: Clarifications: In kindergarten and 1st grade, students learn the difference be	FLA K12 FF 2 1 [.]	
ELA.K12.EE.3.1: Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. ELA.K12.EE.3.1: Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence. ELA.K12.EE.5.1: Use the accepted rules governing a specific format to create quality work. ELA.K12.EE.6.1: Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work. ELA.K12.EE.6.1: Use appropriate voice and tone when speaking or writing. Clarifications: In kindergarte		See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1: Clarifications: ELA.K12.EE.3.1: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smilling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. ELA.K12.EE.3.1: Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence. ELA.K12.EE.5.1: Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work. ELA.K12.EE.6.1: Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends in kindergarten and		Make inferences to support comprehension.
ELAK12.EE.5.1: Students will have interfects before the work siniler of interfects and interfects and interfects and apply them in 2nd grade and beyond. ELA.K12.EE.5.1: Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations. In grades 3-12, students engage in academic conversations. In grades 3-12, students engage in academic conversations. In grades 3-12, students engage in academic conversations. In grades 3-12, students engage in academic conversations. In grades 3-12, students engage in academic conversations. In grades 3-12, students engage in academic conversation, and support claims and counterclaims with evidence. Use the accepted rules governing a specific format to create quality work. ELA.K12.EE.5.1: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work. ELA.K12.EE.6.1: Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language		Clarifications:
beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence. ELA.K12.EE.5.1: Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work. ELA.K12.EE.6.1: Clarifications: BLA.K12.EE.6.1: Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts. ELA.K12.EE.6.1: English language learners communicate information. i	ELA.N12.EE.3.1.	girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and
ELA.K12.EE.6.1: Clarifications: In kindergarten students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence. ELA.K12.EE.5.1: Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work. ELA.K12.EE.6.1: Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts. ELD.K12.ELLSC.1: English language learners communicate information. ideas and concepts necessary for academic success in the content area of Science		beyond.
ELA.K12.EE.4.1: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence. ELA.K12.EE.5.1: Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work. ELA.K12.EE.6.1: Use appropriate voice and tone when speaking or writing. ELA.K12.EE.6.1: Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts. ELD.K12.ELL.SC.1: English language learners communicate information. ideas and concepts necessary for academic success in the content area of Science		Clarifications:
ELA.K12.EE.4.1: In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence. ELA.K12.EE.5.1: Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work. ELA.K12.EE.6.1: Use appropriate voice and tone when speaking or writing. Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts. ELD.K12.ELL.SC.1: English language learners communicate information. ideas and concepts necessary for academic success in the content area of Science		In kindergarten, students learn to listen to one another respectfully.
ELA.K12.EE.6.1: Use appropriate voice and tone when speaking or writing. ELA.K12.EE.6.1: Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.	ELA.K12.EE.4.1:	In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
ELA.K12.EE.6.1: Use appropriate voice and tone when speaking or writing. ELA.K12.EE.6.1: Clarifications: Students build on ideas, propel the conversation, and support claims and counterclaims with evidence. ELA.K12.EE.6.1: Use the accepted rules governing a specific format to create quality work. ELA.K12.EE.6.1: Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work. ELA.K12.EE.6.1: Use appropriate voice and tone when speaking or writing. Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts. ELD.K12.ELL.SC.1: English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science		In grades 3-12 students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills
ELA.K12.EE.5.1: Use the accepted rules governing a specific format to create quality work. ELA.K12.EE.5.1: Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work. ELA.K12.EE.6.1: Use appropriate voice and tone when speaking or writing. ELA.K12.EE.6.1: Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts. ELD.K12.ELL.SC.1: English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science		Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1: Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work. ELA.K12.EE.6.1: Use appropriate voice and tone when speaking or writing. Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts. ELD.K12.ELL.SC.1: English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science	ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work. ELA.K12.EE.6.1: Use appropriate voice and tone when speaking or writing. Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts. ELD.K12.ELL.SC.1: English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science		Clarifications:
ELA.K12.EE.6.1: Use appropriate voice and tone when speaking or writing. ELA.K12.EE.6.1: Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts. ELD.K12.ELL.SC.1: English language learners communicate information. ideas and concepts necessary for academic success in the content area of Science		Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to
ELA.K12.EE.6.1: Use appropriate voice and tone when speaking or writing. Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts. ELD.K12.ELL.SC.1: English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science		do quality work.
ELA.K12.EE.6.1: Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.		Use appropriate voice and tone when speaking or writing.
In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.	ELA.K12.EE.6.1:	Clarifications:
ELD.K12.ELL.SC.1: English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science		In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts
	FLD.K12 FLL SC 1	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science

GENERAL NOTES

If this course is to be used in a STEM sequence in place of either the comprehensive or subject specific course sequences, teachers should refer to the test item specifications for the 8th grade SSA for information on tested standards which can be found at: https://www.fldoe.org/core/fileparse.php/5663/urlt/swsatisG8.pdf.

This course is an integrated Science, Technology, Engineering and Mathematics (STEM) course for middle school students. M/J STEM Physical Science includes an integration of standards from science, mathematics, and english/language arts (ELA) through the application to STEM problem solving using physical science knowledge and science and engineering practices. Physical sciences through applications such as aeronautics, robotics, rocketry, mechanical, electrical, and civil engineering, are emphasized in this course. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by other using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- · Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information.

ISTE Standards (http://www.iste.org/docs/pdfs20-14_ISTE_Standards-S_PDF.pdf) should be incorporated in many contexts throughout the course.

Course Standards

Use grade appropriate Nature of Science and mathematics content benchmarks (i.e., if this course is offered to seventh grade students, then the SC.7.N benchmarks should be integrated into the course content, and SC.6.N and SC.8.N benchmarks should be omitted from the seventh grade course).

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

Additional Instructional Resources:

A.V.E. for Success Collection: http://www.fasa.net/4DCGI/cms/review.html?Action=CMS_Document&DocID=139

GENERAL INFORMATION

Course Number: 2001025

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: Earth/Space Sciences > Abbreviated Title: M/J STEM ASTRO/SPACE Course Length: Year (Y) Course Attributes:

Educator Certifications

Chemistry (Grades 6-12)

Physics (Grades 6-12) Earth/Space Science (Grades 6-12)

Middle Grades Integrated Curriculum (Middle Grades 5-9)

Middle Grades General Science (Middle Grades 5-9)

M/J International Baccalaureate MYP Earth/Space Science (#2001030) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at: http://www.ibo.org/en/programmes/

GENERAL INFORMATION

Course Number: 2001030

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: Earth/Space Sciences > Abbreviated Title: M/J IB MYP ERT/SP SC Course Length: Year (Y) Course Attributes: • International Baccalaureate (IB) Course Level: 3

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 6,7,8

Educator Certifications

Science (Secondary Grades 7-12) Middle Grades Integrated Curriculum (Middle Grades 5-9) Earth/Space Science (Grades 6-12) Middle Grades General Science (Middle Grades 5-9) Physics (Grades 6-12) Chemistry (Grades 6-12)

M/J Comprehensive Science 1 (#2002040) 2015 - 2022 (current)

	Description
SC.6.E.6.1:	Describe and give examples of ways in which Earth's surface is built up and torn down by physical and chemical weathering, erosion, and deposition.
SC.6.E.6.2:	Recognize that there are a variety of different landforms on Earth's surface such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes and relate these landforms as they apply to Florida.
SC.6.F.7.1:	Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through Farth's system.
SC.6.E.7.2:	Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate.
SC.6.E.7.3:	Describe how global patterns such as the jet stream and ocean currents influence local weather in measurable terms such as temperature, air pressure, wind direction and speed, and humidity and precipitation.
SC.6.F.7.4:	Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere.
SC.6.E.7.5:	Explain how energy provided by the sun influences global patterns of atmospheric movement and the temperature differences between air, water,
SC 6 F 7 6	Differentiate between weather and climate
SC 6 F 7 7:	Investigate how natural disasters have affected human life in Florida
SC 6 F 7 8:	Describe ways human beings protect themselves from hazardous weather and sun exposure
SC 6 F 7 9	Describe how the composition and structure of the atmosphere protects life and insulates the planet
SC.6.L.14.1:	Describe and identify patterns in the hierarchical organization of organisms from atoms to molecules and cells to tissues to organs to organ systems to organisms
SC.6.L.14.2:	Investigate and explain the components of the scientific theory of cells (cell theory): all organisms are composed of cells (single-celled or multi- cellular), all cells come from pre-existing cells, and cells are the basic unit of life.
SC.6.L.14.3:	Recognize and explore how cells of all organisms undergo similar processes to maintain homeostasis, including extracting energy from food, getting rid of waste, and reproducing.
SC.6.L.14.4:	Compare and contrast the structure and function of major organelles of plant and animal cells, including cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles.
SC.6.L.14.5:	Identify and investigate the general functions of the major systems of the human body (digestive, respiratory, circulatory, reproductive, excretory, immune, nervous, and musculoskeletal) and describe ways these systems interact with each other to maintain homeostasis.
SC.6.L.14.6:	Compare and contrast types of infectious agents that may infect the human body, including viruses, bacteria, fungi, and parasites.
SC.6.L.15.1:	Analyze and describe how and why organisms are classified according to shared characteristics with emphasis on the Linnaean system combined with the concept of Domains.
SC.6.N.1.1:	Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.6.N.1.2:	Explain why scientific investigations should be replicable.
SC.6.N.1.3:	Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.
SC.6.N.1.4:	Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.
SC.6.N.1.5:	Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.
SC.6.N.2.1:	Distinguish science from other activities involving thought.
SC.6.N.2.2:	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.
SC.6.N.2.3:	Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals.
SC.6.N.3.1:	Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.
SC.6.N.3.2:	Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.
SC.6.N.3.3:	Give several examples of scientific laws.
SC.6.N.3.4:	Identify the role of models in the context of the sixth grade science benchmarks.
SC.6.P.11.1:	Explore the Law of Conservation of Energy by differentiating between potential and kinetic energy. Identify situations where kinetic energy is transformed into potential energy and vice versa.
SC.6.P.12.1:	Measure and graph distance versus time for an object moving at a constant speed. Interpret this relationship.
SC.6.P.13.1:	Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational.
SC.6.P.13.2:	Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much mass the objects have and how far apart they are.
SC.6.P.13.3:	Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both.
LAFS.6.SL.1.1:	 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. b. Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed. c. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under
	discussion. d. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.
LAFS.6.SL.1.2:	Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.

LAFS.6.SL.1.3:	Delineate a speaker's argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.
LAFS.6.SL.2.4:	Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use
	appropriate eye contact, adequate volume, and clear pronunciation.
LAFS.0.3L.2.3.	Cite specific textual evidence to support analysis of science and technical texts
LAFS 68 RST 1 2	Determine the central ideas or conclusions of a text: provide an accurate summary of the text distinct from prior knowledge or opinions
LAFS.68.RST.1.3:	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LAFS.68.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.
LAFS.68.RST.2.5:	Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.
LAFS.68.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
LAFS.68.RST.3.7:	diagram, model, graph, or table).
LAFS.68.RST.3.8:	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
LAFS.68.RST.3.9:	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
LAFS.68.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports the argument presented.
LAFS.68.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples. c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to inform about or explain the topic. e. Establish and maintain a formal style and objective tone. f. Provide a concluding statement or section that follows from and supports the information or explanation presented.
LAFS.68.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.68.WHST.2.5:	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and adulience have been addressed.
LAFS.68.WHST.2.6:	Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.
LAFS.68.WHST.3.7:	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
LAFS.68.WHST.3.8:	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
LAFS.68.WHST.3.9:	Draw evidence from informational texts to support analysis reflection, and research.
LAFS.68.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
MAFS.6.EE.3.9:	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.
MAFS.6.SP.2.4:	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
MAFS.6.SP.2.5:	 Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting

1	Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
MAFS.K12.MP.3.1:	Construct viable arguments and critique the reasoning of others. Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	standard Relation to Course: Supporting Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
ELD.K12 FLL SC 1	Standard Relation to Course: Supporting English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science

ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
HE.6.C.1.3:	Identify environmental factors that affect personal health.
	Clarifications: Air and water quality, availability of sidewalks, contaminated food, and road hazards.
HE.6.C.1.5:	Explain how body systems are impacted by hereditary factors and infectious agents.
	Clarifications: Cystic fibrosis affects respiratory and a digestive system, sickle-cell anemia affects the circulatory system, and influenza affects the respiratory system.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection: http://www.fasa.net/4DCGI/cms/review.html?Action=CMS_Document&DocID=139

GENERAL INFORMATION

Course Number: 2002040

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: M/J COMP SCI 1 Course Length: Year (Y) Course Attributes: • Class Size Core Required Course Level: 2

Educator Certifications

Science (Elementary Grades 1-6)
Science (Secondary Grades 7-12)
Physics (Grades 6-12)
Earth/Space Science (Grades 6-12)
Middle Grades General Science (Middle Grades 5-9)
Middle Grades Integrated Curriculum (Middle Grades 5-9)
Chemistry (Grades 6-12)
Biology (Grades 6-12)
Elementary Education (Grades K-6)
Elementary Education (Elementary Grades 1-6)

M/J Comprehensive Science 1 (#2002040) 2022 - And Beyond

Name	Description			
SC.6.E.6.1:	Describe and give examples of ways in which Earth's surface is built up and torn down by physical and chemical weathering, erosion, and deposition.			
SC 6 F 6 2.	Recognize that there are a variety of different landforms on Earth's surface such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes			
50.0.L.0.Z.	and relate these landforms as they apply to Florida.			
SC.6.E.7.1:	Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through Earth's system.			
SC.6.E.7.2:	Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate.			
SC.6.E.7.3:	Describe how global patterns such as the jet stream and ocean currents influence local weather in measurable terms such as temperature, air pressure, wind direction and speed, and humidity and precipitation.			
SC.6.E.7.4:	Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere.			
SC.6.E.7.5:	Explain how energy provided by the sun influences global patterns of atmospheric movement and the temperature differences between air, water, and land.			
SC.6.E.7.6:	Differentiate between weather and climate.			
SC.6.E.7.7:	Investigate how natural disasters have affected human life in Florida.			
SC.6.E.7.8:	Describe ways human beings protect themselves from hazardous weather and sun exposure.			
SC.6.E.7.9:	Describe how the composition and structure of the atmosphere protects life and insulates the planet.			
SC.6.L.14.1:	Describe and identify patterns in the hierarchical organization of organisms from atoms to molecules and cells to tissues to organs to organ systems to organisms.			
SC.6.L.14.2:	Investigate and explain the components of the scientific theory of cells (cell theory): all organisms are composed of cells (single-celled or multi- cellular), all cells come from pre-existing cells, and cells are the basic unit of life.			
6671140	Recognize and explore how cells of all organisms undergo similar processes to maintain homeostasis, including extracting energy from food, getting			
SU.O.L. 14.3:	rid of waste, and reproducing.			
SC.6.L.14.4:	Compare and contrast the structure and function of major organelles of plant and animal cells, including cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles.			
SC.6.L.14.5:	Identify and investigate the general functions of the major systems of the human body (digestive, respiratory, circulatory, reproductive, excretory, immune, nervous, and musculoskeletal) and describe ways these systems interact with each other to maintain homeostasis.			
SC.6.L.14.6:	Compare and contrast types of infectious agents that may infect the human body, including viruses, bacteria, fungi, and parasites.			
SC.6.L.15.1:	Analyze and describe how and why organisms are classified according to shared characteristics with emphasis on the Linnaean system combined with the concept of Domains.			
SC.6.N.1.1:	Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.			
SC.6.N.1.2:	Explain why scientific investigations should be replicable.			
SC.6.N.1.3:	Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.			
SC.6.N.1.4:	Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.			
SC.6.N.1.5:	Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.			
SC.6.N.2.1:	Distinguish science from other activities involving thought.			
SC.6.N.2.2:	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.			
SC.6.N.2.3:	Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals.			
SC.6.N.3.1:	Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.			
SC.6.N.3.2:	Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.			
SC.6.N.3.3:	Give several examples of scientific laws.			
SC.6.N.3.4:	Identify the role of models in the context of the sixth grade science benchmarks.			
SC.6.P.11.1:	Explore the Law of Conservation of Energy by differentiating between potential and kinetic energy. Identify situations where kinetic energy is transformed into potential energy and vice versa.			
SC.6.P.12.1:	Measure and graph distance versus time for an object moving at a constant speed. Interpret this relationship.			
SC.6.P.13.1:	Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational.			
SC.6.P.13.2:	Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much mass the objects have and how far apart they are.			
SC.6.P.13.3:	Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both.			
	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach. 			
MA.K12.MTR.1.1:	Heip and support each other when attempting a new method or approach.			
	Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others:			
	Foster perseverance in students by choosing tasks that are challenging			
	i osto, por sever unice in studento by choosing tusits that are chancinging.			

	 Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:
MA.K12.MTR.2.1:	 Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations.
	 Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Charter to the students that the transmission of the students are different encoded and different structures.
	Show students that values representations can have different purposes and can be useful in different situations. Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:
MA.K12.MTR.3.1:	 Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations.
	 Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes.
	 Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. Clarifications:
	 Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
	Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving.

	 Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts:
MA.K12.MTR.7.1:	 Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
	Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 students continue with previous skills and use a style guide to create a proper citation.9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends
	differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts. English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SC.1: ELD.K12.ELL.SI.1:	differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts. English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science. English language learners communicate for social and instructional purposes within the school setting.
ELD.K12.ELL.SC.1: ELD.K12.ELL.SI.1: HE.6.C.1.3:	differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts. English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science. English language learners communicate for social and instructional purposes within the school setting. Identify environmental factors that affect personal health. Clarifications: As and write a wellty, environmental factors.
ELD.K12.ELL.SC.1: ELD.K12.ELL.SI.1: HE.6.C.1.3:	differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts. English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science. English language learners communicate for social and instructional purposes within the school setting. Identify environmental factors that affect personal health. Clarifications: Air and water quality, availability of sidewalks, contaminated food, and road hazards.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection: http://www.fasa.net/4DCGI/cms/review.html?Action=CMS_Document&DocID=139

GENERAL INFORMATION

Course Path: Section: Grades PreK to 12 Education
Courses > Grade Group: Grades 6 to 8 Education
Courses > Subject: Science > SubSubject: General
Sciences >
Abbreviated Title: M/J COMP SCI 1
Course Length: Year (Y)
Course Attributes:
Class Size Core Required
Course Level: 2

Educator Cortifications

Grade Level(s): 6,7,8

Chemistry (Grades 6-12)

Biology (Grades 6-12) Elementary Education (Grades K-6)

Elementary Education (Elementary Grades 1-6)

M/J Comprehensive Science 1, Advanced (#2002050) 2015 - 2022 (current)

Name	Description
SC.6.E.6.1:	Describe and give examples of ways in which Earth's surface is built up and torn down by physical and chemical weathering, erosion, and deposition.
SC.6.E.6.2:	Recognize that there are a variety of different landforms on Earth's surface such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes and relate these landforms as they apply to Florida.
SC.6.E.7.1:	Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through Earth's system.
SC.6.E.7.2:	Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate.
	Describe how global patterns such as the jet stream and ocean currents influence local weather in measurable terms such as temperature, air
SC.6.E.7.3:	pressure, wind direction and speed, and humidity and precipitation.
SC.6.E.7.4:	Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere.
SC.6.E.7.5:	Explain how energy provided by the sun influences global patterns of atmospheric movement and the temperature differences between air, water, and land.
SC.6.E.7.6:	Differentiate between weather and climate.
SC.6.E.7.7:	Investigate how natural disasters have affected human life in Florida.
SC.6.E.7.8:	Describe ways human beings protect themselves from hazardous weather and sun exposure.
SC.6.E.7.9:	Describe how the composition and structure of the atmosphere protects life and insulates the planet.
SC.6.L.14.1:	Describe and identify patterns in the hierarchical organization of organisms from atoms to molecules and cells to tissues to organs to organ systems to organisms.
SC.6.L.14.2:	Investigate and explain the components of the scientific theory of cells (cell theory): all organisms are composed of cells (single-celled or multi- cellular), all cells come from pre-existing cells, and cells are the basic unit of life.
SC.6.L.14.3:	Recognize and explore how cells of all organisms undergo similar processes to maintain homeostasis, including extracting energy from food, getting rid of waste, and reproducing.
SC.6.L.14.4:	Compare and contrast the structure and function of major organelles of plant and animal cells, including cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles.
SC.6.L.14.5:	Identify and investigate the general functions of the major systems of the human body (digestive, respiratory, circulatory, reproductive, excretory, immune, nervous, and musculoskeletal) and describe ways these systems interact with each other to maintain homeostasis.
SC.6.L.14.6:	Compare and contrast types of infectious agents that may infect the human body, including viruses, bacteria, fungi, and parasites.
SC.6.L.15.1:	Analyze and describe how and why organisms are classified according to shared characteristics with emphasis on the Linnaean system combined with the concept of Domains.
SC.6.N.1.1:	Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.6.N.1.2:	Explain why scientific investigations should be replicable.
SC.6.N.1.3:	Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.
SC.6.N.1.4:	Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.
SC.6.N.1.5:	Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.
SC.6.N.2.1:	Distinguish science from other activities involving thought.
SC.6.N.2.2:	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.
SC.6.N.2.3:	Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals.
SC.6.N.3.1:	Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.
SC.6.N.3.2:	Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.
SC.6.N.3.3:	Give several examples of scientific laws.
SC.6.N.3.4:	Identify the role of models in the context of the sixth grade science benchmarks.
SC.6.P.11.1:	Explore the Law of Conservation of Energy by differentiating between potential and kinetic energy. Identify situations where kinetic energy is transformed into potential energy and vice versa.
SC.6.P.12.1:	Measure and graph distance versus time for an object moving at a constant speed. Interpret this relationship.
SC.6.P.13.1:	Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational.
SC.6.P.13.2:	Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much mass the objects have and how far apart they are.
SC.6.P.13.3:	Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both.
SC.912.E.7.3:	Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.
SC.912.E.7.5:	Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions.
SC.912.E.7.6:	Relate the formation of severe weather to the various physical factors.
SC.912.L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).
•	

SC.912.L.14.3:	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.		
SC.912.L.16.14:	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.		
SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter.		
LAFS.6.SL.1.1:	 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. b. Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed. c. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion. d. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing. 		
LAFS.6.SL.1.2:	Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study		
LAFS.6.SL.1.3:	Delineate a speaker's argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.		
LAFS.6.SL.2.4:	Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.		
LAFS.6.SL.2.5:	Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.		
LAFS.68.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts.		
LAFS.68.RST.1.2:	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.		
LAI 3.00.K31.1.3.	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical		
LAFS.68.RST.2.4:	context relevant to grades 6–8 texts and topics.		
LAFS.68.RST.2.5:	topic.		
LAFS.68.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.		
LAFS.68.RST.3.7:	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).		
LAFS.68.RST.3.8:	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.		
LAFS.68.RST.3.9:	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.		
LAFS.68.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports the argument presented. 		
LAFS.68.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples. c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to inform about or explain the topic. e. Establish and maintain a formal style and objective tone. f. Provide a concluding statement or section that follows from and supports the information or explanation presented. 		
LAFS.68.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.		
LAFS.68.WHST.2.5:	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.		
LAFS.68.WHST.2.6:	Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.		
LAFS.68.WHST.3.7:	related, focused questions that allow for multiple avenues of exploration.		
LAFS.68.WHST.3.8:	source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.		
LAFS.68.WHST.3.9:	Draw evidence from informational texts to support analysis reflection, and research.		
LAFS.68.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.		
MAFS.6.EE.3.9:	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. <i>For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.</i>		
MAFS.6.SP.1.3:	Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.		
MAFS.6.SP.2.4:	Display numerical data in plots on a number line, including dot plots, histograms, and box plots. Summarize numerical data sets in relation to their context, such as by:		

	a. Reporting the number of observations.
	b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
MAFS.6.SP.2.5:	c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as
	describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered
	d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.
	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two
MAFS.7.SP.2.4:	populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a
	fourth-grade science book.
	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers
MAFS.7.SP.3.5:	indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor
	Make sense of problems and persevere in solving them
	wake sense of problems and persevere in solving them.
	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They
	analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution attempt. They consider analogous problems, and try special cases and simpler forms of the
	original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students
	might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get
IVIAF3.N12.IVIP.1.1.	the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and
	graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on
	using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems
	using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	complex problems and identity con espondences between one on approaches.
	Standard Relation to Course: Supporting
	Reason abstractly and quantitatively.
	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities
	to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically
MAFS.K12.MP.2.1:	and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize to hause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative
	reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of
	quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
	Construct viable arguments and critique the reasoning of others.
	Mathematically proficient students understand and use stated assumptions, definitions, and providually established results in constructing
	arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze
	situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others,
	and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from
MAFS.K12.MP.3.1:	which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct
	logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct
	though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies
	Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve
	the arguments.
	Standard Relation to Course: Supporting
	Model with mathematics.
	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In
	early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional
	reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem
MAFS K12 MP 4 1	or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know
	are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are
	able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical
	results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Pelation to Course: Supporting
	Use appropriate tools strategically.
	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper,
	concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software
	Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools
MAFS.K12.MP.5.1:	graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other
	mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying
	assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to
	identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are
	able to use technological tools to explore and deepen their understanding of concepts.
	Attend to precision
	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose including using the equival size consistently and appropriately. They are exceptive
	about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and
MAFS.K12.MP.6.1:	efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give

	carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions. Standard Relation to Course: Supporting	
	Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression x ² +	
MAFS.K12.MP.7.1:	$9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y .	
	Standard Relation to Course: Supporting	
MAFS.K12.MP.8.1:	Look for and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results. Standard Relation to Course: Supporting	
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.	
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.	
HE.6.C.1.3:	Identify environmental factors that affect personal health. Clarifications: Air and water quality, availability of sidewalks, contaminated food, and road hazards.	
	Explain how body systems are impacted by hereditary factors and infectious agents.	
HE.6.C.1.5:	Clarifications: Cystic fibrosis affects respiratory and a digestive system, sickle-cell anemia affects the circulatory system, and influenza affects the respiratory system.	

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.

• Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course	Number:	2002050
00001.00	rearriser.	2002000

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: M/J COMP SCI 1 ADV Course Length: Year (Y) Course Attributes: • Class Size Core Required Course Level: 3

Course Status: Course Approved Grade Level(s): 6,7,8

Educator Certifications

Science (Elementary Grades 1-6)	
Science (Secondary Grades 7-12)	
Middle Grades Integrated Curriculum (Middle Grades 5-9)	
Chemistry (Grades 6-12)	
Biology (Grades 6-12)	
Middle Grades General Science (Middle Grades 5-9)	
Physics (Grades 6-12)	
Earth/Space Science (Grades 6-12)	
Elementary Education (Grades K-6)	
Elementary Education (Elementary Grades 1-6)	

M/J Comprehensive Science 1, Advanced (#2002050) 2022 - And Beyond

Name	Description
SC.6.E.6.1:	Describe and give examples of ways in which Earth's surface is built up and torn down by physical and chemical weathering, erosion, and deposition.
SC.6.E.6.2:	Recognize that there are a variety of different landforms on Earth's surface such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes and relate these landforms as they apply to Florida.
SC.6.E.7.1:	Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through Earth's system.
SC.6.E.7.2:	Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate.
	Describe how global patterns such as the jet stream and ocean currents influence local weather in measurable terms such as temperature, air
SC.6.E.7.3:	pressure, wind direction and speed, and humidity and precipitation.
SC.6.E.7.4:	Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere.
SC.6.E.7.5:	Explain how energy provided by the sun influences global patterns of atmospheric movement and the temperature differences between air, water, and land.
SC.6.E.7.6:	Differentiate between weather and climate.
SC.6.E.7.7:	Investigate how natural disasters have affected human life in Florida.
SC.6.E.7.8:	Describe ways human beings protect themselves from hazardous weather and sun exposure.
SC.6.E.7.9:	Describe how the composition and structure of the atmosphere protects life and insulates the planet.
SC.6.L.14.1:	Describe and identify patterns in the hierarchical organization of organisms from atoms to molecules and cells to tissues to organs to organ systems to organisms.
SC.6.L.14.2:	Investigate and explain the components of the scientific theory of cells (cell theory): all organisms are composed of cells (single-celled or multi- cellular), all cells come from pre-existing cells, and cells are the basic unit of life.
SC.6.L.14.3:	Recognize and explore how cells of all organisms undergo similar processes to maintain homeostasis, including extracting energy from food, getting rid of waste, and reproducing.
SC.6.L.14.4:	Compare and contrast the structure and function of major organelles of plant and animal cells, including cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles.
SC.6.L.14.5:	Identify and investigate the general functions of the major systems of the human body (digestive, respiratory, circulatory, reproductive, excretory, immune, nervous, and musculoskeletal) and describe ways these systems interact with each other to maintain homeostasis.
SC.6.L.14.6:	Compare and contrast types of infectious agents that may infect the human body, including viruses, bacteria, fungi, and parasites.
SC.6.L.15.1:	Analyze and describe how and why organisms are classified according to shared characteristics with emphasis on the Linnaean system combined with the concept of Domains.
SC.6.N.1.1:	Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.6.N.1.2:	Explain why scientific investigations should be replicable.
SC.6.N.1.3:	Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.
SC.6.N.1.4:	Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.
SC.6.N.1.5:	Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.
SC.6.N.2.1:	Distinguish science from other activities involving thought.
SC.6.N.2.2:	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.
SC.6.N.2.3:	Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals.
SC.6.N.3.1:	Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.
SC.6.N.3.2:	Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.
SC.6.N.3.3:	Give several examples of scientific laws.
SC.6.N.3.4:	Identify the role of models in the context of the sixth grade science benchmarks.
SC.6.P.11.1:	Explore the Law of Conservation of Energy by differentiating between potential and kinetic energy. Identify situations where kinetic energy is transformed into potential energy and vice versa.
SC.6.P.12.1:	Measure and graph distance versus time for an object moving at a constant speed. Interpret this relationship.
SC.6.P.13.1:	Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational.
SC.6.P.13.2:	Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much mass the objects have and how far apart they are.
SC.6.P.13.3:	Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both.
SC.912.E.7.3:	Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.
SC.912.E.7.5:	Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions.
SC.912.E.7.6:	Relate the formation of severe weather to the various physical factors.
SC.912.L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).
•	

SC.912.L.14.3:	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.
SC.912.L.16.14:	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.
SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter.
MA.K12.MTR.1.1:	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach. Clarifications: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. Clarifications:

	 Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts:
	 Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
MA.K12.MTR.7.1:	Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details
ELA.K12.EE.1.1:	from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills.
	Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends

	differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
	Identify environmental factors that affect personal health.
HE.6.C.1.3:	Clarifications: Air and water quality, availability of sidewalks, contaminated food, and road hazards.
	Explain how body systems are impacted by hereditary factors and infectious agents.
HE.6.C.1.5:	Clarifications: Cystic fibrosis affects respiratory and a digestive system, sickle-cell anemia affects the circulatory system, and influenza affects the respiratory system.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.

5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2002050

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: M/J COMP SCI 1 ADV Course Length: Year (Y) Course Attributes: • Class Size Core Required Course Level: 3

Course Status: State Board Approved Grade Level(s): 6,7,8

Educator Certifications

Science (Elementary Grades 1-6) Science (Secondary Grades 7-12) Middle Grades Integrated Curriculum (Middle Grades 5-9) Chemistry (Grades 6-12) Biology (Grades 6-12) Middle Grades General Science (Middle Grades 5-9) Physics (Grades 6-12) Earth/Space Science (Grades 6-12) Elementary Education (Grades K-6) Elementary Education (Elementary Grades 1-6)

M/J Comprehensive Science 1 Accelerated Honors (#2002055) 2015 - 2022 (current)

Name	Description
SC.6.E.6.1:	Describe and give examples of ways in which Earth's surface is built up and torn down by physical and chemical weathering, erosion, and deposition.
SC.6.E.6.2:	Recognize that there are a variety of different landforms on Earth's surface such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes and relate these landforms as they apply to Florida.
SC.6.E.7.1:	Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through Earth's system.
SC.6.E.7.2:	Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate.
SC.6.E.7.3:	Describe how global patterns such as the jet stream and ocean currents influence local weather in measurable terms such as temperature, air pressure, wind direction and speed, and humidity and precipitation.
SC.6.E.7.4:	Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere.
SC.6.E.7.5:	Explain how energy provided by the sun influences global patterns of atmospheric movement and the temperature differences between air, water, and land.
SC.6.E.7.6:	Differentiate between weather and climate.
SC.6.E.7.7:	Investigate how natural disasters have affected human life in Florida.
SC.6.E.7.8:	Describe ways human beings protect themselves from hazardous weather and sun exposure.
SC.6.E.7.9:	Describe how the composition and structure of the atmosphere protects life and insulates the planet.
SC.6.L.14.1:	Describe and identify patterns in the hierarchical organization of organisms from atoms to molecules and cells to tissues to organs to organ systems to organisms.
SC.6.L.14.2:	Investigate and explain the components of the scientific theory of cells (cell theory): all organisms are composed of cells (single-celled or multi- cellular), all cells come from pre-existing cells, and cells are the basic unit of life.
SC.6.L.14.3:	Recognize and explore how cells of all organisms undergo similar processes to maintain homeostasis, including extracting energy from food, getting rid of waste, and reproducing.
SC.6.L.14.4:	Compare and contrast the structure and function of major organelles of plant and animal cells, including cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles.
SC.6.L.14.5:	Identify and investigate the general functions of the major systems of the human body (digestive, respiratory, circulatory, reproductive, excretory, immune, nervous, and musculoskeletal) and describe ways these systems interact with each other to maintain homeostasis.
SC.6.L.14.6:	Compare and contrast types of infectious agents that may infect the human body, including viruses, bacteria, fungi, and parasites.
SC.6.L.15.1:	Analyze and describe how and why organisms are classified according to shared characteristics with emphasis on the Linnaean system combined with the concept of Domains.
SC.6.N.1.1:	Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.6.N.1.2:	Explain why scientific investigations should be replicable.
SC.6.N.1.3:	Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.
SC.6.N.1.4:	Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.
SC.6.N.1.5:	Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.
SC.6.N.2.1:	Distinguish science from other activities involving thought.
SC.6.N.2.2:	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.
SC.6.N.2.3:	Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals.
SC.6.N.3.1:	Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.
SC.6.N.3.2:	Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.
SC.6.N.3.3:	Give several examples of scientific laws.
SC.6.N.3.4:	Identify the role of models in the context of the sixth grade science benchmarks.
SC.6.P.11.1:	Explore the Law of Conservation of Energy by differentiating between potential and kinetic energy. Identify situations where kinetic energy is transformed into potential energy and vice versa.
SC.6.P.12.1:	Measure and graph distance versus time for an object moving at a constant speed. Interpret this relationship.
SC.6.P.13.1:	Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational.
SC.6.P.13.2:	Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much mass the objects have and how far apart they are.
SC.6.P.13.3:	Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both.
SC.8.N.1.2:	Design and conduct a study using repeated trials and replication.
SC.8.N.1.3:	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.
SC.8.N.1.4:	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.
SC.8.N.1.6:	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
SC.8.P.8.1:	Explore the scientific theory of atoms (also known as atomic theory) by using models to explain the motion of particles in solids, liquids, and gases.

SC.8.P.8.2:	Differentiate between weight and mass recognizing that weight is the amount of gravitational pull on an object and is distinct from, though proportional to, mass.
SC.8.P.8.3:	Explore and describe the densities of various materials through measurement of their masses and volumes.
SC.8.P.8.4:	Classify and compare substances on the basis of characteristic physical properties that can be demonstrated or measured; for example, density, thermal or electrical conductivity, solubility, magnetic properties, melting and boiling points, and know that these properties are independent of the amount of the sample.
SC.8.P.8.5:	Recognize that there are a finite number of elements and that their atoms combine in a multitude of ways to produce compounds that make up all of the living and nonliving things that we encounter.
SC.8.P.8.6:	Recognize that elements are grouped in the periodic table according to similarities of their properties.
SC.8.P.8.7:	Explore the scientific theory of atoms (also known as atomic theory) by recognizing that atoms are the smallest unit of an element and are composed of sub-atomic particles (electrons surrounding a nucleus containing protons and neutrons).
SC.8.P.8.8:	Identify basic examples of and compare and classify the properties of compounds, including acids, bases, and salts.
SC.8.P.8.9:	Distinguish among mixtures (including solutions) and pure substances.
SC.912.E.5.4:	Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth.
SC.912.E.7.3:	Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.
SC.912.E.7.5:	Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions.
SC.912.E.7.6:	Relate the formation of severe weather to the various physical factors.
SC.912.L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).
SC.912.L.14.3:	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.
SC.912.L.16.14:	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.
SC.912.P.8.1:	Differentiate among the four states of matter.
SC.912.P.8.2:	Differentiate between physical and chemical properties and physical and chemical changes of matter.
SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.
SC.912.P.10.4:	states of matter.
LAFS.68.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts.
LAFS.68.RST.1.2:	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
LAF3.08.K31.1.3:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical
LAFS.68.RST.2.4:	context relevant to grades 6-8 texts and topics.
LAFS.68.RST.2.5:	topic.
LAFS.68.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
LAFS.68.RST.3.7:	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LAFS.68.RST.3.8:	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
LAFS.68.RST.3.9:	the same topic.
	Write arguments focused on <i>discipline-specific content.</i>
	and evidence logically.
LAFS.68.WHST.1.1:	b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using cradible sources
	c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.
	d. Establish and maintain a formal style.
	e. Provide a concluding statement or section that follows from and supports the argument presented.
	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
	a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to
	achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.
LAFS.68.WHST.1.2:	 b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples. b. Use appropriate and varied transitions to create spherion and clarify the relationships among ideas and concents.
	d. Use precise language and domain-specific vocabulary to inform about or explain the topic.
	e. Establish and maintain a formal style and objective tone.
	f. Provide a concluding statement or section that follows from and supports the information or explanation presented.
LAFS.68.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.68.WHST.2.5:	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a
LAFS.68.WHST.2.6	new approach, tocusing on how well purpose and audience have been addressed. Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and
	efficiently. Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional
LAFS.68.WHST.3.7:	related, focused questions that allow for multiple avenues of exploration.
LAFS.68.WHST.3.8:	source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
LAFS.68.WHST.3.9:	Draw evidence from informational texts to support analysis reflection, and research.

LAFS.68.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
LAFS.7.SL.1.1:	 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. b. Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed. c. Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed. d. Acknowledge new information expressed by others and when warranted, modify their own views.
	Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas
LAFS.7.SL.1.2:	clarify a topic, text, or issue under study.
LAFS.7.SL.1.3:	Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence. Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use
LAFS.7.SL.2.4:	appropriate eye contact, adequate volume, and clear pronunciation.
LAFS.7.SL.2.5: MAFS.7.SP.2.4:	Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.
MAFS.7.SP.3.5:	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
MAFS.8.SP.1.4:	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. <i>For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?</i>
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting
MAFS.K12.MP.2.1:	Reason abstractly and quantitatively. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting Model with mathematics
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose. Standard Relation to Course: Supporting
	Use appropriate tools strategically.

MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
	Analyze how environmental factors affect personal health.
HE.7.C.1.3:	Clarifications: Food refrigeration, appropriate home heating and cooling, air/water quality, and garbage/trash collection.
	Describe how heredity can affect personal health.
HE.7.C.1.7:	Clarifications: Sickle-cell anemia, diabetes, and acne.

GENERAL NOTES

I

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:
- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data
- Using mathematics, information and computer technology, and computational thinking.
- · Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2002055

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: M/J COMPSCI1 ACC HON Course Length: Year (Y) Course Attributes: • Class Size Core Required Course Level: 3

Course Status: Course Approved Grade Level(s): 6,7,8

logy (Grades 6-12)	
th/Space Science (Grades 6-12)	
ddle Grades General Science (Middle Grades 5-9)	
emistry (Grades 6-12)	
/sics (Grades 6-12)	
ence (Secondary Grades 7-12)	

M/J Comprehensive Science 1 Accelerated Honors (#2002055) 2022 - And Beyond

Name	Description
SC.6.E.6.1:	Describe and give examples of ways in which Earth's surface is built up and torn down by physical and chemical weathering, erosion, and deposition.
SC.6.E.6.2:	Recognize that there are a variety of different landforms on Earth's surface such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes and relate these landforms as they apply to Florida.
SC.6.E.7.1:	Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through Earth's system.
SC.6.E.7.2:	Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate.
SC.6.E.7.3:	Describe how global patterns such as the jet stream and ocean currents influence local weather in measurable terms such as temperature, air pressure, wind direction and speed, and humidity and precipitation.
SC.6.E.7.4:	Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere.
SC.6.E.7.5:	Explain how energy provided by the sun influences global patterns of atmospheric movement and the temperature differences between air, water, and land.
SC.6.E.7.6:	Differentiate between weather and climate.
SC.6.E.7.7:	Investigate how natural disasters have affected human life in Florida.
SC.6.E.7.8:	Describe ways human beings protect themselves from hazardous weather and sun exposure.
SC.6.E.7.9:	Describe how the composition and structure of the atmosphere protects life and insulates the planet.
SC.6.L.14.1:	Describe and identify patterns in the hierarchical organization of organisms from atoms to molecules and cells to tissues to organs to organ systems to organisms.
SC.6.L.14.2:	Investigate and explain the components of the scientific theory of cells (cell theory): all organisms are composed of cells (single-celled or multi- cellular), all cells come from pre-existing cells, and cells are the basic unit of life.
SC.6.L.14.3:	Recognize and explore how cells of all organisms undergo similar processes to maintain homeostasis, including extracting energy from food, getting rid of waste, and reproducing.
SC.6.L.14.4:	Compare and contrast the structure and function of major organelles of plant and animal cells, including cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles.
SC.6.L.14.5:	Identify and investigate the general functions of the major systems of the human body (digestive, respiratory, circulatory, reproductive, excretory, immune, nervous, and musculoskeletal) and describe ways these systems interact with each other to maintain homeostasis.
SC.6.L.14.6:	Compare and contrast types of infectious agents that may infect the human body, including viruses, bacteria, fungi, and parasites.
SC.6.L.15.1:	Analyze and describe how and why organisms are classified according to shared characteristics with emphasis on the Linnaean system combined with the concept of Domains.
SC.6.N.1.1:	Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.6.N.1.2:	Explain why scientific investigations should be replicable.
SC.6.N.1.3:	Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.
SC.6.N.1.4:	Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.
SC.6.N.1.5:	Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.
SC.6.N.2.1:	Distinguish science from other activities involving thought.
SC.6.N.2.2:	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.
SC.6.N.2.3:	Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals.
SC.6.N.3.1:	Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.
SC.6.N.3.2:	Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.
SC.6.N.3.3:	Give several examples of scientific laws.
SC.6.N.3.4:	Identify the role of models in the context of the sixth grade science benchmarks.
SC.6.P.11.1:	Explore the Law of Conservation of Energy by differentiating between potential and kinetic energy. Identify situations where kinetic energy is transformed into potential energy and vice versa.
SC.6.P.12.1:	Measure and graph distance versus time for an object moving at a constant speed. Interpret this relationship.
SC.6.P.13.1:	Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational.
SC.6.P.13.2:	Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much mass the objects have and how far apart they are.
SC.6.P.13.3:	Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both.
SC.8.N.1.2:	Design and conduct a study using repeated trials and replication.
SC.8.N.1.3:	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.
SC.8.N.1.4:	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.
SC.8.N.1.6:	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
SC.8.P.8.1:	Explore the scientific theory of atoms (also known as atomic theory) by using models to explain the motion of particles in solids, liquids, and gases.

Sci.8.1.3.1 Explore and storable the denominand of action method in the storage frequencies of the storage of	SC.8.P.8.2:	Differentiate between weight and mass recognizing that weight is the amount of gravitational pull on an object and is distinct from, though proportional to, mass.
Construction of provide compares allocations on the sole of exposure improves improves the care is a construction sole of exposure in the comparison of the	SC.8.P.8.3:	Explore and describe the densities of various materials through measurement of their masses and volumes.
Displase Recipies for the main is number of all emotions on the intermediation of a model into they is the product components in the left og all emotions in a model. CARPA & Comparison of the left og all emotions are compared in the predict able compared inter all emotions are compared in the predict intermediation of a model inte	SC.8.P.8.4:	Classify and compare substances on the basis of characteristic physical properties that can be demonstrated or measured; for example, density, thermal or electrical conductivity, solubility, magnetic properties, melting and boiling points, and know that these properties are independent of the amount of the sample.
Sign B / 6. Recording the stream is any parameter in the principle constrainting and the the product base second bits over a stream is the prior of an experiment and are contracted of stream is an experim is an experiment and are contracted of stream is an e	SC.8.P.8.5:	Recognize that there are a finite number of elements and that their atoms combine in a multitude of ways to produce compounds that make up all of the living and nonliving things that we encounter.
dt R & R / dt Expose the scientific theory of along sizes intoway as a domaining profits and and domain. dt R & R & R / dt Restrict theory of along sizes intoway as a domaining profits and and domaining and the scientific transmission. dt R & R & R / dt Restrict theory of along sizes intoway and scientific transmission. dt R & R & R / dt Restrict theory of along sizes intoway and scientific transmission. dt R & R & R / dt Restrict theory of along sizes intoway and scientific transmission. dt R & R & R / dt Restrict theory of along sizes intoway and scientific transmission. dt R & R / dt Restrict theory of along sizes intoway and scientific transmission. dt R & R / dt Restrict theory of along sizes intoway and scientific transmission. dt R / dt R	SC.8.P.8.6:	Recognize that elements are grouped in the periodic table according to similarities of their properties.
Sci B 8.8 Weinflybasic examples of duration compare and inside the properties of concentration to duration actions. Sci B 8.9 Deferguine many ensures (findular sciences) excernors. Sci B 8.9 Deferguine many ensures (findular sciences). Sci B 8.2 Deferguine many ensures (findular sciences). Sci D 2.7.3 Deferguine many excernors. Sci D 2.7.3 Deferguine many excernors. Sci D 2.7.5 Reade the formation of severe weighter the values of plant and animal cells. Sci D 2.7.5 Reade the formation of severe weighter the values of plant and animal cells. Sci D 2.7.5 Reade the formation of severe weighter to the values of plant and animal cells. Sci D 2.7.6 Reade the formation of severe weighter to the values of plant and animal cells. Sci D 2.7.6 Deferentiate anough the finar science of malities and response of mitass is the severe of animal and animal cells. Sci D 2.7.1.6 Deferentiate anough the finar science of malities. Sci D 2.7.2.7.6 Deferentiate anough the finar science of malities. Sci D 2.7.2.7.6 Deferentiate anough the finar science of malities. Sci D 2.7.2.7.6 Deferentiate anough the finar science of malities. Sci D 2.7.2.7.6 Deferentiate anough the finar science of malitie. <t< td=""><td>SC.8.P.8.7:</td><td>Explore the scientific theory of atoms (also known as atomic theory) by recognizing that atoms are the smallest unit of an element and are composed of sub-atomic particles (electrons surrounding a puckus containing protons and peutrons)</td></t<>	SC.8.P.8.7:	Explore the scientific theory of atoms (also known as atomic theory) by recognizing that atoms are the smallest unit of an element and are composed of sub-atomic particles (electrons surrounding a puckus containing protons and peutrons)
Sci B / 9 Designing many instruction production solutions and parts declarances. Sci B / 26 / 4 Explain the physical increarties of the sample and its dyname roum and reamed them its conditions and seems on Earth. Sci B / 26 / 3 Producting synthesis interactions among farms systems. Including atmosphere, hydrocybree, cryosphere, and become in the various interactions among farms systems. Including atmosphere, hydrocybree, cryosphere, and become in the annota interactions among farms systems. Including atmosphere, hydrocybree, cryosphere, and become in the compare and control farms farmed annotable site. The physical factors Sci B / 22 / 16 Related structures in function of the the compare structures of physical factors Sci B / 22 / 16 Related structures in function of mather advanced acts. Compare and control for the general structures of an actes the transport. Sci B / 22 / 16 Describe the outly due including the provises of mathers. Spatian ther role of neutrances are advanced in impactability dromosphere and structures of physical and themical compariso and structures. Sci B / 22 / 10 Describe the neutropic including the provises of mathers. Sci B / 22 / 10 Describe the neutropic including the provises of mathers. Sci B / 22 / 10 Describe the neutropic including the provises of mathers. Sci B / 22 / 10 Describe the neutropic including the provises of mathers. Sci B / 22 / 10 Describe the neutropic mathers of mathers.	SC.8.P.8.8:	Identify basic examples of and compare and classify the properties of compounds, including acids, bases, and salts,
SQ 92.5.2.4 Explain the physical properties of the Suin and its dynamic nature and control them to accellations and weeks on Each. SQ 92.5.7.3 Explain the physical properties of the Suin and its dynamic nature and control them to accellations. SQ 92.5.7.5 Explain the physical properties of the Suin and its dynamic advancement. Including a through two, themptone, and two accelerations. SQ 92.5.7.5 Explain the physical properties of the subsect on physical factors. SQ 92.5.1.8 Explain the formation of succes and the subsect on physical factors. SQ 92.5.1.8 Explain the constant on factors and constant of physical and animal calls. Compare and control the general structures of physical and animal calls. Compare and control the general structures of animal animal calls. Compare and control the general structures of the subsect on physical and physical properties. SQ 92.1.1.8.1.4 Description has the general structures of mitods. Space in the result on subsect on the subsect on physical and physical and the subsect on physical and the subsect on the	SC.8.P.8.9:	Distinguish among mixtures (including solutions) and pure substances.
50.712.07.3 Differentiate and decrete the vertices interactions among Earth systems, including, atmosphere, hydrosphere, cryosphere, and lexphere. 50.715.7.6 Restar the formation of severe werther to the vertices of parts and animat cells. Spatial that calculate and restarguize limitations and uncartabilities of seven predictions. 50.712.7.6 Restar the formation of severe werther to the vertices of parts and animat cells. Compare and contrast the general structures of an animat cells. Compare and contrast the general structures of animation animat cells. Compare and contrast the general structures of and animat cells. 50.712.7.6.3 Describe the cell cycle, including the process of matteric. 50.712.7.6.3 Differentiate and more than the general structures of parts and animat cells. Compare and contrast the general structures of parts and structures. 50.712.7.6.3 Differentiate and more than the general structures of parts and animat cells. Compare and contrast the general structure of extension of more cells, and its importance in maintaining compares and the cell cycle. Including the process of matter. 50.712.7.6.3 Differentiate and more than the general structures of parts and animat cells. Compares and compares and matterial compares and the cell cycle. Including the process of matter. 50.712.7.6.3 Intergue formation process of matter. 50.712.7.6.3 Differentiate and more than the general structures. 50.712.7.6.3 Network the contrast the general structures of matter. 50.712.7.6.3 Network the contrast the general structures. 50.712.7.6.3 Netw	SC.912.E.5.4:	Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth.
PAIR 25.9. Predict future worther conditions based or present discussions and compiled initialities and uncontainties of such predictions. SCIPE 2.7.6. Reals The formation of sever watcher to the versious physical tactors. SCIPE 2.7.6. Reals The formation of the sever watcher to the versious physical tactors. SCIPE 2.7.6. Reals The formation of the sever watcher to the versious physical tactors. SCIPE 2.1.1.1.2 Compare and contrast the general a tructures of plant and animal cells. Compare and contrast the general structures of protacyptic and exacyptic cells. SCIPE 2.5. Differentiate and monogenets of mutatics. Explant the cell cyclic, including the process of mutatic. SCIPE 2.5. Differentiate monogenets for structures of mutatics. Explant tactors. SCIPE 2.5. Differentiate monogenets of mutatics. Compare and contrast the general information of new cells, and tactors. SCIPE 2.5. Differentiate monogenets of mutatics. Compare and contrast the general structure. SCIPE 2.5. Differentiate monogenets of mutatics. Compare and contrast the general structure of version. SCIPE 2.5. Differentiate monogenets of mutatics. Compare and contrast the general structure of version. SCIPE 2.5. Differentiate monogenets of mutatics. Compare and structure of version. SCIPE 2.5. Differentiate monogenets of mutatics. Compare and contrast the general structure of version. SCIPE 2.5. <td< td=""><td>SC.912.E.7.3:</td><td>Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.</td></td<>	SC.912.E.7.3:	Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.
SC 912.E1/3 Reliable the formation of source wather to the various physical factors. SC 912.L1/2 Reliable transport). SC 912.L1/2 Reliable transport). SC 912.L1/3 Compore and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells. SC 912.L1/6.141. Describe the cell cycle. Including the process of misses. Explain the role of misses in the tormation of new sells and its importance in maintaining chromosame number auring associal reports and physical and chemical changes of matter. SC 912.P.8.1 Differentiate between physical and chemical properties and physical and chemical changes of matter. SC 912.P.8.1 Unitoryot forward programmations of motions. And one opnoounds in forward or composition and reports. SC 912.P.8.1 Nutriment forward programmations of motions. SC 912.P.8.1 Nutriment forward programmations of matter. SC 912.P.8.1 <td< td=""><td>SC.912.E.7.5:</td><td>Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions.</td></td<>	SC.912.E.7.5:	Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions.
6.912 L14.2 Relies structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive an active transport). 6.912 L16.3: Compare and contrast the general structures of protecyclic and exkaryotic cells. 6.912 L16.14: Describe the cell cycle, including the process of mitors. Topping the role is not interport. 6.912 L16.14: Deferminate among the four states of matter. 5.912 P8.2 Differminate bitween objects and chemical proceedies and compounds in terms of composition and structure. 5.912 P8.2 Differminate at the energy transferred by convection, conduction, and radiation, and radia and and the radiation and radiation and and and the ra	SC.912.E.7.6:	Relate the formation of severe weather to the various physical factors.
Characteristic Compare and contrast the general structures of print and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells. Characteristic Bioscrib the cell cycle including the process of mitods. Explain the role of mitods in the tormation of new cells and its importance in maintaining dromosome number during association and structure. Sci 912 P.B.3 Differentiate among the four sales of matter. Sci 912 P.B.3 Differentiate among the four sales of matter. Sci 912 P.B.3 Differentiate at the energy transferred by compares and projectal and chemical charges of matter. Sci 912 P.B.3 Differentiate at the energy transferred by compares and or projectal sole of matter. Sci 912 P.B.3 Differentiates who participate in drottil learning both individually and with others: Ack guestions that with help with soleing the torus and projectal soleing a challenging task. Stay engaged and maintain a positive minibate who we know as soleing and projectal. Ack guestions that with help with soleing task soleing a challenging task. Stay engaged and maintain a positive minibate when we know as soleing a provem. Ack guestions that with help with soleing task soleing problems in multiple ways. Ack guestions that with an admittain a positive minibate when we know as soleing a provem. Califications Califications Califications who demonstrate understanding by constraint grotelers in multiple ways. Nultiple ways. Nultiple ways. Stay engaged and maintain a postructer minibate when we knein grotelers in multiple ways	SC.912.L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).
MARCENTION Describe the cell cycle, including the process of mitods. Explain the role of mitods in the formation of new cells and its importance in maintaining dremosous assaults reprodues and typestal and chemical changes of matter. SC912.P.B.1 Differentiate among the four states of matter. SC912.P.B.2 Interpret formula representations of molecules and compounds in forms of composition and splain the connection of heat to change in femperature or states of matter. SC912.P.D.4 Describe heat as the energy transferred by convection. conduction, and cycle in the connection of heat to change in femperature or states of matter. SC912.P.D.4 Describe heat as the energy transferred by convection. conduction, and cycle in the connection of heat to change in femperature or states of matter. SC912.P.D.4 Describe heat as the energy transferred by convection. conduction and cycle in the connection of heat to change in femperature or states of matter. SC912.P.D.4 Describe heat as the energy transferred by convection. conduction and cycle in the connection of heat to change in femperature or states of matter. SC912.P.D.4 Describe heat as the energy transferred by convection. conductant or approach. ALT as the sympatic as the sympathy that tasks are stated with as bold individually and with others: State of matter. State connucle to prove the matter when worting to solve tasks. State connucle to analyze and problem solve. Controle provements in students by choosing tasks that are challenging. Develope student as an exercon as students to prove the solve. State difficut	SC.912.L.14.3:	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.
SC 912.P.1: Differentiate among the four states of matter. SC 912.P.2. Differentiate among the four states of matter. SC 912.P.2. Differentiate among the four states of matter. SC 912.P.3. Describe heat and heanical properties and physical and chemical changes of matter. SC 912.P.10.4: Describe heat as the energy transferred by convection. conduction, and residution, and exploit the connection of heat to change in temporature of states of matter. SC 912.P.10.4: Adapter anticipate in direct of the other states of matter. A Rays the problem in a way that makes sense given the task. Adapter anticipate in direct of the other states of matter. Adapter and support task of the indirect of the individually and with others: Adapter anticipate individually and with others: Addition of the individual sector and support task of the individual sector and states of the individually and with others: Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: <t< td=""><td>SC.912.L.16.14:</td><td>Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.</td></t<>	SC.912.L.16.14:	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.
SC 912.8.2. Differentiate between physical and chemical properties and physical and chemical changes of matter. SC 912.8.17. Interpret formula orgoestantions of molecular interms of composition and structure. SC 912.8.17.4 Describe heat as the energy transformed by convection, conduction, and realistion, and explain the connection of heat to change in temperature or states of matter. SC 912.8.10.4. Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Build perswerance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive minister the solve task. Lielpi and Support each other when attempting a new method or approach. Clarifications: Califications: Califications: Califications: Califications: Califications: Califications: Determentation demonstrate understanding by sense tasks. Explores who encourse and problem solve. Readings the when solving challenging problems. Determentation who demonstrate understanding by to using docidect, drawings to using adjorthms and equations. Express connections between concepts and engressimaliants. Represent solutions to problems in multiple ways. Attemption who encourse a term of the demonstrate understanding by terpresenting problems. Chaid estudents form concrites to up the instermating through problems	SC.912.P.8.1:	Differentiate among the four states of matter.
SC 912.P.7: Interpret formula representations of molecules and compounds in terms of composition and struture. SC 912.P.10.4: Describe heat as the energy transformed by convection, conduction, and radiation, and explain the connection of heat to change in temperature of states of matter. SC 912.P.10.4: Mathematicans who participate in effortful learning both individually and with others: Analyze the problem in a way that makes some given the task. Build presentance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positise mindset when working to solve tasks. Heig and support each other when attempting a new method or approach. Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Clarifications: Describe students' effort when solving that are challenging. Describe students' effort when asymptoties in multiple ways: Build understanding through modeling and using manipulatives. Progress from modeling problems who: Progress from modeling problems in multiple ways: Euclid anderstanding through modeling and using manipulatives. Express connections between concepts and re	SC.912.P.8.2:	Differentiate between physical and chemical properties and physical and chemical changes of matter.
Sc. 912.P. 10.4 Describe heat as the energy transferred by convection, conduction, and capabin the connection of heat to change in temperature of states of matter. Analyze the problem in a way that mukes sense given the task. A natyze the problem in a way that mukes sense given the task. A NALE 2.4TR 1.1: Analyze of other ways the problem in a way that mukes sense given the task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach. Clarifications: Clarifications: Foster perseverance in students by choosing tasks that are challenging. Develop students ably of growth middex teamers. Foster perseverance in students by choosing tasks that are challenging. Develop students abling to analyze and problem solve. Recognize students for them solve in multiple ways: Mathematicians who demonstrate understanding by representing problems. Demonstrate understanding mough modeling and using manipulatives. Fogress from modeling problems with origota and develops subgets, drawings tables, graphs and equations. Fragress from modeling problems with odemonstrate understanding by representing problems in multiple ways: Fulder students for demonstrate understanding by representing problems in multiple ways: Fulder students for demonstrate understanding by representing problems in multiple ways: Fulder students for demonstrate understand upy representing problems in multiple ways: Fueries whon encourage stud	SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.
Market 2.MTR.2.1: Wathermaticians who participate in effortful learning both individually and with others: Add questions that will help with solving the task. Size questions that will help with solving the task. MAK12.MTR.1.1: Ediafications: Tradeners who encourage students to participate actively in effortful learning both individually and with others: . Clarifications: Tradeners who encourage students to participate actively in effortful learning both individually and with others: . Outwate a community of growth mindset learners. . Foreign representation is students by choosing tasks that are challenging. . Develop students' effort when solving challenging problems. Demonstrate understanding by representing problems in multiple ways. MAK12.MTR.2.1: Choose a representation students by choosing tasks that are challenging algorithms and equations. . Forgress from modeling problems in multiple ways. . Build understanding try presenting problems in multiple ways. . Choose a representation step on bothers in multiple ways. . Forgress from modeling problems in multiple ways. . Provide coprotinities for students to demonstrate understanding by representations. . Choose a representation step on students to demonstrate understanding trepresentations	SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter.
MAK12 MTR.1.1: Chartfrictions: Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth minkset learners. • Cultivate a community of growth minkset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' ability to analyze and problem solve. • Recognize students' ability to analyze and problem in multiple ways: • Build understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems with objects and drawings to using algorithms and equations. • Progress from modeling problems with object and drawings to using algorithms and equations. • Express connections between concepts and representiations. • Clarifications: • Choose a representation based on the given context or purpose. Clarifications: • Foovide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstret representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Suide students that various representations can have different purposes and can be useful in different situations.	MA.K12.MTR.1.1:	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Use and support once other when a thermatical as approach.
MAK12.MTR.3.1: Demonstrate understanding by representing problems in multiple ways: Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations. Complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Makitain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use flexibacts to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students when the purpove flickency when performing procedures and mental calculations. Complete tasks accurately and with confidence		Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.3.1: Complete tasks with mathematical fluency. MA.K12.MTR.3.1: Select efficient and appropriate methods for solving problems within the given context. MA.K12.MTR.3.1: Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used. Engage in discussions that reflect on the mathematical thinking of self and others.	MA.K12.MTR.2.1:	 Mathematicians who demonstrate understanding by representing problems in multiple ways. Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Clarifications: Guide students for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
	MA.K12.MTR.3.1:	 Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used. Engage in discussions that reflect on the mathematical thinking of self and others.

	mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
MA.K12.MTR.4.1:	Communicate mathematical ideas, vocabulary and methods effectively.Analyze the mathematical thinking of others.
	Compare the efficiency of a method to those expressed by others.
	Recognize errors and suggest how to correctly solve the task.
	Construct possible arguments based on evidence.
	 Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts.
	Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
	Focus on relevant details within a problem.
	Create plans and procedures to logically order events, steps or ideas to solve problems.
	Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts.
	 Look for similarities among problems.
MA.K12.MTR.5.1:	Connect solutions of problems to more complicated large-scale situations.
	Clarifications:
	 Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts
	 Support students to develop generalizations based on the similarities found among problems.
	 Provide opportunities for students to create plans and procedures to solve problems.
	• Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions.
	 Estimate to discover possible solutions. Use henchmark quantities to determine if a solution makes sonse.
	Check calculations when solving problems.
	 Verify possible solutions by explaining the methods used.
MA.K12.MTR.6.1:	Evaluate results based on the given context.
	Clarifications:
	Teachers who encourage students to assess the reasonableness of solutions:
	 Prompt students to continually ask, "Does this solution make sense? How do you know?"
	Reinforce that students check their work as they progress within and after a task.
	Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts:
	Connect mathematical concepts to everyday experiences.
	Use models and methods to understand, represent and solve problems.
	Perform investigations to gather data or determine if a method is appropriate. Redesign models and methods to improve accuracy or
MA.K12.MTR.7.1:	
	Teachers who encourage students to apply mathematics to real-world contexts:
	Provide opportunities for students to create models, both concrete and abstract, and perform investigations.
	Challenge students to question the accuracy of their models and methods.
	 Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Cite evidence to evilain and justify reasoning
	K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details
	from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.
	2-3 students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	4.5 Students continue with previous skills and reference comments made by speakers and poors. Students site tayte that they we directly
	quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently
	Acceleration and the complex taxes proficiently.

ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension.
	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
	Analyze how environmental factors affect personal health.
HE.7.C.1.3:	Clarifications: Food refrigeration, appropriate home heating and cooling, air/water quality, and garbage/trash collection.
	Describe how heredity can affect personal health.
HE.7.C.1.7:	Clarifications: Sickle-cell anemia, diabetes, and acne.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.

- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2002055

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: M/J COMPSCI1 ACC HON Course Length: Year (Y) Course Attributes: • Class Size Core Required Course Level: 3

Course Status: State Board Approved Grade Level(s): 6,7,8

Biology (Grades 6-12)	
Earth/Space Science (Grades 6-12)	
Middle Grades General Science (Middle Grades 5-9)	
Chemistry (Grades 6-12)	
Physics (Grades 6-12)	
Science (Secondary Grades 7-12)	

M/J Science 1 Cambridge Lower Secondary (#2002056) 2014 - 2022 (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-secondary-1/cambridge-secondary-1/curriculum/.

GENERAL INFORMATION

Course Number: 2002056

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: M/J SCI 1 CLS Course Length: Year (Y) Course Attributes: • Advanced International Certificate of Education (AICE) Course Level: 3

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 6,7,8

Biology (Grades 6-12)
Earth/Space Science (Grades 6-12)
Middle Grades General Science (Middle Grades 5-9)
Chemistry (Grades 6-12)
Physics (Grades 6-12)
Science (Secondary Grades 7-12)

M/J Science 1 Cambridge Lower Secondary (#2002056) 2022 - And Beyond

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-secondary-1/cambridge-secondary-1/curriculum/.

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education

Courses > Subject: Science > SubSubject: General

• Advanced International Certificate of Education

Abbreviated Title: M/J SCI 1 CLS Course Length: Year (Y) Course Attributes:

Sciences >

(AICE)

Course Level: 3

GENERAL INFORMATION

Course Number: 2002056

Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): 6,7,8

iology (Grades 6-12)
arth/Space Science (Grades 6-12)
liddle Grades General Science (Middle Grades 5-9)
hemistry (Grades 6-12)
hysics (Grades 6-12)
cience (Secondary Grades 7-12)

M/J International Baccalaureate MYP Comprehensive Science 1 (#2002060) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at: http://www.ibo.org/en/programmes/

GENERAL INFORMATION

Course Number: 2002060

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: M/J IB MYP COMP SCI1 Course Length: Year (Y) Course Attributes: • International Baccalaureate (IB) Course Level: 3

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 6,7,8

Science (Elementary Grades 1-6)
Science (Secondary Grades 7-12)
Middle Grades Integrated Curriculum (Middle Grades 5-9)
Chemistry (Grades 6-12)
Middle Grades General Science (Middle Grades 5-9)
Physics (Grades 6-12)
Earth/Space Science (Grades 6-12)
Biology (Grades 6-12)
Elementary Education (Grades K-6)
Elementary Education (Elementary Grades 1-6)

M/J Comprehensive Science 2 (#2002070) 2015 - 2022 (current)

Name	Description
SC.7.E.6.1:	Describe the layers of the solid Earth, including the lithosphere, the hot convecting mantle, and the dense metallic liquid and solid cores.
SC.7.E.6.2:	Identify the patterns within the rock cycle and relate them to surface events (weathering and erosion) and sub-surface events (plate tectonics and mountain building).
SC.7.E.6.3:	Identify current methods for measuring the age of Earth and its parts, including the law of superposition and radioactive dating.
SC.7.E.6.4:	Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes.
SC.7.E.6.5:	Explore the scientific theory of plate tectonics by describing how the movement of Earth's crustal plates causes both slow and rapid changes in Earth's surface, including volcanic eruptions, earthquakes, and mountain building.
SC.7.E.6.6:	Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.
SC.7.E.6.7:	Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean basins.
SC.7.L.15.1:	Recognize that fossil evidence is consistent with the scientific theory of evolution that living things evolved from earlier species.
SC.7.L.15.2:	Explore the scientific theory of evolution by recognizing and explaining ways in which genetic variation and environmental factors contribute to evolution by natural selection and diversity of organisms.
SC.7.L.15.3:	Explore the scientific theory of evolution by relating how the inability of a species to adapt within a changing environment may contribute to the extinction of that species.
SC.7.L.16.1:	Understand and explain that every organism requires a set of instructions that specifies its traits, that this hereditary information (DNA) contains genes located in the chromosomes of each cell, and that heredity is the passage of these instructions from one generation to another.
SC.7.L.16.2:	Determine the probabilities for genotype and phenotype combinations using Punnett Squares and pedigrees.
SC.7.L.16.3:	Compare and contrast the general processes of sexual reproduction requiring meiosis and asexual reproduction requiring mitosis.
SC.7.L.16.4:	Recognize and explore the impact of biotechnology (cloning, genetic engineering, artificial selection) on the individual, society and the environment.
SC.7.L.17.1:	Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.
SC.7.L.17.2:	Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism.
SC.7.L.17.3:	Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.
SC.7.N.1.1:	Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.7.N.1.2:	Differentiate replication (by others) from repetition (multiple trials).
SC.7.N.1.3:	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.
SC.7.N.1.4:	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.
SC.7.N.1.5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.
SC.7.N.1.6:	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.
SC.7.N.1.7:	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.
SC.7.N.2.1:	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.
SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.
SC.7.N.3.2:	Identify the benefits and limitations of the use of scientific models.
SC.7.P.10.1:	Illustrate that the sun's energy arrives as radiation with a wide range of wavelengths, including infrared, visible, and ultraviolet, and that white light is made up of a spectrum of many different colors.
SC.7.P.10.2:	Observe and explain that light can be reflected, refracted, and/or absorbed.
SC.7.P.10.3:	Recognize that light waves, sound waves, and other waves move at different speeds in different materials.
SC.7.P.11.1:	Recognize that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state.
SC.7.P.11.2:	Investigate and describe the transformation of energy from one form to another.
SC.7.P.11.3:	Cite evidence to explain that energy cannot be created nor destroyed, only changed from one form to another.
SC.7.P.11.4:	Observe and describe that heat flows in predictable ways, moving from warmer objects to cooler ones until they reach the same temperature.
LAFS.68.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts.
LAFS.68.RST.1.2:	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
LAFS.68.RST.1.3:	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LAFS.68.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.
LAFS.68.RST.2.5:	Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.
LAFS.68.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
LAFS.68.RST.3.7:	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LAFS.68.RST.3.8:	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
LAFS.68.RST.3.9:	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

LAFS.68.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports the argument presented.
LAFS.68.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples. c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to inform about or explain the topic. e. Establish and maintain a formal style and objective tone. f. Provide a concluding statement or section that follows from and supports the information or explanation presented.
LAFS.68.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.68.WHST.2.5:	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
LAFS.68.WHST.2.6:	Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.
LAFS.68.WHST.3.7:	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
LAFS.68.WHST.3.8:	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
LAFS.68.WHST.3.9:	Draw evidence from informational texts to support analysis reflection, and research. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of
LAFS.68.WHST.4.10:	discipline-specific tasks, purposes, and audiences.
LAFS.7.SL.1.1:	 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. b. Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed. c. Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed. d. Acknowledge new information expressed by others and, when warranted, modify their own views.
LAFS.7.SL.1.2:	Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas
LAFS.7.SL.1.3:	clarify a topic, text, or issue under study. Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.
LAFS.7.SL.2.4:	Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eve contact, adequate volume, and clear pronunciation.
LAFS.7.SL.2.5:	Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.
MAFS.7.SP.2.4:	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.
MAFS.7.SP.3.5:	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others.

MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting
MAFS.K12.MP.4.1:	Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose. Standard Relation to Course: Supporting
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
MAFS.K12.MP.7.1:	Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression x^2 + 9x + 14, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – 3(x – y) ² as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
MAFS.K12.MP.8.1:	Look for and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
	Analyze how environmental factors affect personal health.
HE.7.C.1.3:	Clarifications: Food refrigeration, appropriate home heating and cooling, air/water quality, and garbage/trash collection
	Explain the likelihood of injury or illness if engaging in unhealthy/risky behaviors.
HE.7.C.1.8:	Clarifications: Abuse of over-the-counter medications, sexually transmitted diseases and sexually transmitted infections from sexual relationships, injury, or death from unsupervised handling of firearms, and physical/emotional injury, or impact from abusive dating partner.

1

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The course also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection: http://www.fasa.net/4DCGI/cms/review.html?Action=CMS_Document&DocID=139

GENERAL INFORMATION	

	Course Path: Section: Grades PreK to 12 Education
0	Courses > Grade Group: Grades 6 to 8 Education
Course Number: 2002070	Courses > Subject: Science > SubSubject: General
	Sciences >
	Abbreviated Title: M/J COMPRE SCI 2
	Course Length: Year (Y)
	Course Attributes:
	Class Size Core Required
	Course Level: 2
Course Status: Course Approved	
Grade Level(s): 6,7,8	

Educator Certifications

Science (Secondary Grades 7-12) Middle Grades Integrated Curriculum (Middle Grades 5-9) Physics (Grades 6-12) Earth/Space Science (Grades 6-12) Middle Grades General Science (Middle Grades 5-9) Biology (Grades 6-12)

Chemistry (Grades 6-12)

M/J Comprehensive Science 2 (#2002070) 2022 - And Beyond

Name	Description
SC.7.E.6.1:	Describe the layers of the solid Earth, including the lithosphere, the hot convecting mantle, and the dense metallic liquid and solid cores.
SC.7.E.6.2:	Identify the patterns within the rock cycle and relate them to surface events (weathering and erosion) and sub-surface events (plate tectonics and mountain building).
SC.7.E.6.3:	Identify current methods for measuring the age of Earth and its parts, including the law of superposition and radioactive dating.
SC.7.E.6.4:	Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes.
SC.7.E.6.5:	Explore the scientific theory of plate tectonics by describing how the movement of Earth's crustal plates causes both slow and rapid changes in Earth's surface including volcanic eruptions, earthquakes, and mountain building.
SC.7.E.6.6:	Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water
SC.7.E.6.7:	Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean
SC.7.L.15.1:	basins. Recognize that fossil evidence is consistent with the scientific theory of evolution that living things evolved from earlier species.
SC.7.L.15.2:	Explore the scientific theory of evolution by recognizing and explaining ways in which genetic variation and environmental factors contribute to evolution by natural selection and diversity of organisms.
SC.7.L.15.3:	Explore the scientific theory of evolution by relating how the inability of a species to adapt within a changing environment may contribute to the extinction of that species.
SC.7.L.16.1:	Understand and explain that every organism requires a set of instructions that specifies its traits, that this hereditary information (DNA) contains genes located in the chromosomes of each cell, and that heredity is the passage of these instructions from one generation to another.
SC.7.L.16.2:	Determine the probabilities for genotype and phenotype combinations using Punnett Squares and pedigrees.
SC.7.L.16.3:	Compare and contrast the general processes of sexual reproduction requiring meiosis and asexual reproduction requiring mitosis.
SC.7.L.16.4:	Recognize and explore the impact of biotechnology (cloning, genetic engineering, artificial selection) on the individual, society and the environment.
SC 7 17 1	Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web
SC 7 L 17 2	Compare and contrast the relationshins among organisms such as mutualism predation parasitism competition and commensalism
50.7.E.T7.2.	Describe and investigate various limiting factors in the local ecosystem and their impact on pative populations, including food shelter, water, space
SC.7.L.17.3:	disease, parasitism, predation, and nesting sites.
	Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out
SC.7.N.1.1:	scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.7.N.1.2:	Differentiate replication (by others) from repetition (multiple trials).
SC.7.N.1.3:	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.
SC.7.N.1.4:	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.
SC.7.N.1.5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.
SC.7.N.1.6:	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.
SC.7.N.1.7:	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.
SC.7.N.2.1:	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are
SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them
	Inch.
SC.7.P.10.1:	Illustrate that the sun's energy arrives as radiation with a wide range of wavelengths, including infrared, visible, and ultraviolet, and that white light is
	made up of a spectrum of many different colors.
SC.7.P.10.2:	Observe and explain that light can be reflected, refracted, and/or absorbed.
SC.7.P.10.3:	Recognize that light waves, sound waves, and other waves move at different speeds in different materials.
SC.7.P.11.1:	Recognize that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state.
SC.7.P.11.2:	Investigate and describe the transformation of energy from one form to another.
SC.7.P.11.3:	Cite evidence to explain that energy cannot be created nor destroyed, only changed from one form to another.
SC.7.P.11.4:	Observe and describe that heat flows in predictable ways, moving from warmer objects to cooler ones until they reach the same temperature.
	Mathematicians who participate in effortful learning both individually and with others:
	Analyze the problem in a way that makes sense given the task.
	Ask questions that will help with solving the task.
	 Build perseverance by modifying methods as needed while solving a challenging task.
MA.K12.MTR.1.1:	 Stay engaged and maintain a positive mindset when working to solve tasks.
	Help and support each other when attempting a new method or approach.
	Teachers who encourage students to participate actively in effortful learning both individually and with others
	Cultivate a community of anowth mindset learners
	Contracte a community of growth minuser reamers. Factor parsoverance in students by choosing tasks that are challenging
	Toster perseverance in students by choosing tasks that are changing. Develop students' ability to apply a problem set is
	Develop students ability to analyze and problem solve.
	Recognize students' effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways.

MA.K12.MTR.2.1:	 Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose.
	 Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	 Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	 Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.

MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications:
	 Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
HE.7.C.1.3:	Analyze how environmental factors affect personal health. Clarifications: Food refrigeration, appropriate home heating and cooling, air/water guality, and garbage/trash collection.
	Explain the likelihood of injury or illness if engaging in unbealthy/risky behaviors
HE.7.C.1.8:	Clarifications: Abuse of over-the-counter medications, sexually transmitted diseases and sexually transmitted infections from sexual relationships, injury, or death from unsupervised handling of firearms, and physical/emotional injury, or impact from abusive dating partner.
L	

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental

procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- · Using mathematics, information and computer technology, and computational thinking.
- · Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- · Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection: http://www.fasa.net/4DCGI/cms/review.html?Action=CMS_Document&DocID=139

GENERAL INFORMATION

Course Number: 2002070
Course Number: 2002070
Course Number: 2002070
Course > Subject: Science > SubSubject: General
Sciences >
Abbreviated Title: M/J COMPRE SCI 2
Course Length: Year (Y)
Course Attributes:
Class Size Core Required
Course Level: 2
Course Status: State Board Approved

Grade Level(s): 6,7,8

Educator Certifications

Science (Secondary Grades 7-12) Middle Grades Integrated Curriculum (Middle Grades 5-9) Physics (Grades 6-12) Earth/Space Science (Grades 6-12) Middle Grades General Science (Middle Grades 5-9) Biology (Grades 6-12) Chemistry (Grades 6-12)

M/J Comprehensive Science 2, Advanced (#2002080) 2015 - 2022 (current)

Name	Description
SC.7.E.6.1:	Describe the layers of the solid Earth, including the lithosphere, the hot convecting mantle, and the dense metallic liquid and solid cores.
SC.7.E.6.2:	Identify the patterns within the rock cycle and relate them to surface events (weathering and erosion) and sub-surface events (plate tectonics and mountain building).
SC.7.E.6.3:	Identify current methods for measuring the age of Earth and its parts, including the law of superposition and radioactive dating.
SC.7.E.6.4:	Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes.
SC.7.E.6.5:	Explore the scientific theory of plate tectonics by describing how the movement of Earth's crustal plates causes both slow and rapid changes in Earth's surface, including volcanic eruptions, earthquakes, and mountain building.
SC.7.E.6.6:	Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.
SC.7.E.6.7:	Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean basins.
SC.7.L.15.1:	Recognize that fossil evidence is consistent with the scientific theory of evolution that living things evolved from earlier species.
SC.7.L.15.2:	Explore the scientific theory of evolution by recognizing and explaining ways in which genetic variation and environmental factors contribute to evolution by natural selection and diversity of organisms.
SC.7.L.15.3:	Explore the scientific theory of evolution by relating how the inability of a species to adapt within a changing environment may contribute to the extinction of that species.
SC.7.L.16.1:	Understand and explain that every organism requires a set of instructions that specifies its traits, that this hereditary information (DNA) contains genes located in the chromosomes of each cell, and that heredity is the passage of these instructions from one generation to another.
SC.7.L.16.2:	Determine the probabilities for genotype and phenotype combinations using Punnett Squares and pedigrees.
SC.7.L.16.3:	Compare and contrast the general processes of sexual reproduction requiring meiosis and asexual reproduction requiring mitosis.
SC.7.L.16.4:	Recognize and explore the impact of biotechnology (cloning, genetic engineering, artificial selection) on the individual, society and the environment.
SC.7.L.17.1:	Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.
SC.7.L.17.2:	Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism.
SC.7.1.17.3:	Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space,
	disease, parasitism, predation, and nesting sites.
SC.7.N.1.1:	Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.7.N.1.2:	Differentiate replication (by others) from repetition (multiple trials).
SC.7.N.1.3:	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.
SC.7.N.1.4:	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.
SC.7.N.1.5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.
SC.7.N.1.6:	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.
SC.7.N.1.7:	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.
SC.7.N.2.1:	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.
SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.
SC.7.N.3.2:	Identify the benefits and limitations of the use of scientific models.
SC.7.P.10.1:	Illustrate that the sun's energy arrives as radiation with a wide range of wavelengths, including infrared, visible, and ultraviolet, and that white light is made up of a spectrum of many different colors.
SC.7.P.10.2:	Observe and explain that light can be reflected, refracted, and/or absorbed.
SC.7.P.10.3:	Recognize that light waves, sound waves, and other waves move at different speeds in different materials.
SC.7.P.11.1:	Recognize that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state.
SC.7.P.11.2:	Investigate and describe the transformation of energy from one form to another.
SC.7.P.11.3:	Cite evidence to explain that energy cannot be created nor destroyed, only changed from one form to another.
SC.7.P.11.4:	Observe and describe that heat flows in predictable ways, moving from warmer objects to cooler ones until they reach the same temperature.
SC.912.E.6.1:	Describe and differentiate the layers of Earth and the interactions among them.
SC.912.E.6.2:	Connect surface features to surface processes that are responsible for their formation.
SC.912.E.6.3:	Analyze the scientific theory of plate tectonics and identify related major processes and features as a result of moving plates.
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.16.16:	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.

SC.912.L.17.6:	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.
SC 912 17 9	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels
50.712.E.17.7.	and the reduction of available energy at successive trophic levels.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.
LAFS.08.RST.T.T.	Cite specific textual evidence to support analysis of science and technical texts.
AFS.68.RST.1.3:	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LAFS.68.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.
LAFS.68.RST.2.5:	Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.
LAFS.68.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
LAFS.68.RST.3.7:	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LAFS.68.RST.3.8:	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
LAFS.68.RST.3.9:	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
LAFS.68.WHST.1.1:	 write arguments rocused on <i>discipline-specific content</i>. a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports the argument presented.
	e. Howe a concluding statement of section that follows normand supports the argument presented.
LAFS.68.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples. c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to inform about or explain the topic. e. Establish and maintain a formal style and objective tone. f. Provide a concluding statement or section that follows from and supports the information or explanation presented.
LAFS 68 WHST 2-4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience
LAFS.68.WHST.2.5:	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
LAFS.68.WHST.2.6:	Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.
LAFS.68.WHST.3.7:	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
LAFS.68.WHST.3.8:	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
LAFS.68.WHST.3.9:	Draw evidence from informational texts to support analysis reflection, and research.
LAFS.68.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
LAFS.7.SL.1.2:	Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.
LAFS.7.SL.1.3:	Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.
LAFS.7.SL.2.4:	Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use
LAFS.7.SL.2.5:	Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.
MAFS.7.SP.2.4:	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book are generally longer than the words in a chapter of a
MAFS.7.SP.3.5:	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
MAFS.8.SP.1.4:	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. <i>For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?</i>
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on

	using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting Reason abstractly and quantitatively
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting Model with mathematics.
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting
MAFS.K12.MP.5.1:	Use appropriate tools strategically. Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a

	problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
	Analyze how environmental factors affect personal health.
HE.7.C.1.3: HE.7.C.1.7:	Clarifications: Food refrigeration, appropriate home heating and cooling, air/water quality, and garbage/trash collection.
	Describe how heredity can affect personal health.
	Clarifications: Sickle-cell anemia, diabetes, and acne.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The course also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection Course Number: 2002080

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: M/J COMPRE SCI 2 ADV Course Length: Year (Y) Course Attributes: • Class Size Core Required Course Level: 3

Course Status: Course Approved Grade Level(s): 6,7,8

Educator Certifications

Science (Secondary Grades 7-12) Middle Grades Integrated Curriculum (Middle Grades 5-9) Physics (Grades 6-12) Earth/Space Science (Grades 6-12) Middle Grades General Science (Middle Grades 5-9) Chemistry (Grades 6-12) Biology (Grades 6-12)

M/J Comprehensive Science 2, Advanced (#2002080) 2022 - And Beyond

Name	Description
SC.7.E.6.1:	Describe the layers of the solid Earth, including the lithosphere, the hot convecting mantle, and the dense metallic liquid and solid cores.
SC.7.E.6.2:	Identify the patterns within the rock cycle and relate them to surface events (weathering and erosion) and sub-surface events (plate tectonics and mountain building).
SC.7.E.6.3:	Identify current methods for measuring the age of Earth and its parts, including the law of superposition and radioactive dating.
SC.7.E.6.4:	Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes.
SC.7.E.6.5:	Explore the scientific theory of plate tectonics by describing how the movement of Earth's crustal plates causes both slow and rapid changes in Earth's surface, including volcanic eruptions, earthquakes, and mountain building.
SC.7.E.6.6:	Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.
SC.7.E.6.7:	Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean basins.
SC.7.L.15.1:	Recognize that fossil evidence is consistent with the scientific theory of evolution that living things evolved from earlier species.
SC.7.L.15.2:	Explore the scientific theory of evolution by recognizing and explaining ways in which genetic variation and environmental factors contribute to evolution by natural selection and diversity of organisms.
SC.7.L.15.3:	Explore the scientific theory of evolution by relating how the inability of a species to adapt within a changing environment may contribute to the extinction of that species.
SC.7.L.16.1:	Understand and explain that every organism requires a set of instructions that specifies its traits, that this hereditary information (DNA) contains genes located in the chromosomes of each cell, and that heredity is the passage of these instructions from one generation to another.
SC.7.L.16.2:	Determine the probabilities for genotype and phenotype combinations using Punnett Squares and pedigrees.
SC.7.L.16.3:	Compare and contrast the general processes of sexual reproduction requiring meiosis and asexual reproduction requiring mitosis.
SC.7.L.16.4:	Recognize and explore the impact of biotechnology (cloning, genetic engineering, artificial selection) on the individual, society and the environment.
SC.7.L.17.1:	Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.
SC.7.L.17.2:	Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism.
SC.7.1.17.3:	Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space,
	disease, parasitism, predation, and nesting sites.
SC.7.N.1.1:	Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.7.N.1.2:	Differentiate replication (by others) from repetition (multiple trials).
SC.7.N.1.3:	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.
SC.7.N.1.4:	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.
SC.7.N.1.5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.
SC.7.N.1.6:	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.
SC.7.N.1.7:	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.
SC.7.N.2.1:	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.
SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.
SC.7.N.3.2:	Identify the benefits and limitations of the use of scientific models.
SC.7.P.10.1:	Illustrate that the sun's energy arrives as radiation with a wide range of wavelengths, including infrared, visible, and ultraviolet, and that white light is made up of a spectrum of many different colors.
SC.7.P.10.2:	Observe and explain that light can be reflected, refracted, and/or absorbed.
SC.7.P.10.3:	Recognize that light waves, sound waves, and other waves move at different speeds in different materials.
SC.7.P.11.1:	Recognize that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state.
SC.7.P.11.2:	Investigate and describe the transformation of energy from one form to another.
SC.7.P.11.3:	Cite evidence to explain that energy cannot be created nor destroyed, only changed from one form to another.
SC.7.P.11.4:	Observe and describe that heat flows in predictable ways, moving from warmer objects to cooler ones until they reach the same temperature.
SC.912.E.6.1:	Describe and differentiate the layers of Earth and the interactions among them.
SC.912.E.6.2:	Connect surface features to surface processes that are responsible for their formation.
SC.912.E.6.3:	Analyze the scientific theory of plate tectonics and identify related major processes and features as a result of moving plates.
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.16.16:	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.

SC.912.L.17.6:	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels
CC 010 D 10 1.	and the reduction of available energy at successive trophic levels.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
56.712.1.10.5.	Mathematicians who participate in effortful learning both individually and with others:
	Analyze the problem in a way that makes sense given the task.
	Ask questions that will help with solving the task.
	Build perseverance by modifying methods as needed while solving a challenging task.
	Stay engaged and maintain a positive mindset when working to solve tasks.
MA.K12.MTR.1.1:	Help and support each other when attempting a new method or approach.
	Clarifications:
	Cultivate a community of growth mindset learners.
	Foster perseverance in students by choosing tasks that are challenging.
	Develop students' ability to analyze and problem solve.
	Recognize students' effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways.
	Mathematicians who demonstrate understanding by representing problems in multiple ways:
	Build understanding through modeling and using manipulatives.
	Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
	 Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concents and corresponditions.
MA K12 MTR 2 1	 Choose a representation based on the given context or purpose.
	Clarifications:
	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:
	Help students make connections between concepts and representations.
	Provide opportunities for students to use manipulatives when investigating concepts.
	 Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:
	 Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations
	Complete tasks accurately and with confidence.
	Adapt procedures to apply them to a new context.
MA.K12.M1R.3.1:	Use feedback to improve efficiency when performing calculations.
	Clarifications:
	Teachers who encourage students to complete tasks with mathematical fluency:
	 Offer multiple opportunities for students to practice efficient and generalizable methods.
	Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others.
	Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
	Communicate mathematical ideas, vocabulary and methods effectively.
	Analyze the mathematical thinking of others.
	Compare the efficiency of a method to those expressed by others.
	Recognize errors and suggest how to correctly solve the task.
MA.K12.MTR.4.1:	Justify results by explaining methods and processes. Construct possible arguments based on evidence
	Clarifications:
	Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:
	• Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.
	Create opportunities for students to discuss their thinking with peers.
	Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.
	Develop students ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
	Focus on relevant details within a problem.
	Create plans and procedures to logically order events, steps or ideas to solve problems.
	Decompose a complex problem into manageable parts.
	Relate previously learned concepts to new concepts.
MA.K12.MTR.5.1:	Look for similarities among problems.
	Connect solutions of problems to more complicated large-scale situations.
	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concents:

	 Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use herebrark quantities to determine if a solution makes sense.
	 Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
	Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts:
	 Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
MA.K12.MTR.7.1:	Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 students continue with previous skins and should be aware or existing style guides and the ways in which they drive.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.

ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.	
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.	
HE.7.C.1.3:	Analyze how environmental factors affect personal health.	
	Clarifications: Food refrigeration, appropriate home heating and cooling, air/water quality, and garbage/trash collection.	
HE.7.C.1.7:	Describe how heredity can affect personal health.	
	Clarifications: Sickle-cell anemia, diabetes, and acne.	

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGl/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: M/J COMPRE SCI 2 ADV Course Length: Year (Y) Course Attributes: • Class Size Core Required Course Level: 3

Course Status: State Board Approved Grade Level(s): 6,7,8

Educator Certifications

Science (Secondary Grades 7-12) Middle Grades Integrated Curriculum (Middle Grades 5-9) Physics (Grades 6-12) Earth/Space Science (Grades 6-12) Middle Grades General Science (Middle Grades 5-9) Chemistry (Grades 6-12) Biology (Grades 6-12)

M/J Comprehensive Science 2 Accelerated Honors (#2002085) 2015 - 2022 (current)

Name	Description
SC.7.E.6.1:	Describe the layers of the solid Earth, including the lithosphere, the hot convecting mantle, and the dense metallic liquid and solid cores.
SC.7.E.6.2:	Identify the patterns within the rock cycle and relate them to surface events (weathering and erosion) and sub-surface events (plate tectonics and mountain building).
SC.7.E.6.3:	Identify current methods for measuring the age of Earth and its parts, including the law of superposition and radioactive dating.
SC.7.E.6.4:	Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes.
SC.7.E.6.5:	Explore the scientific theory of plate tectonics by describing how the movement of Earth's crustal plates causes both slow and rapid changes in Earth's surface, including volcanic eruptions, earthquakes, and mountain building.
SC.7.E.6.6:	Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.
SC.7.E.6.7:	Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean basins.
SC.7.L.15.1:	Recognize that fossil evidence is consistent with the scientific theory of evolution that living things evolved from earlier species.
SC.7.L.15.2:	Explore the scientific theory of evolution by recognizing and explaining ways in which genetic variation and environmental factors contribute to evolution by natural selection and diversity of organisms.
SC.7.L.15.3:	Explore the scientific theory of evolution by relating how the inability of a species to adapt within a changing environment may contribute to the extinction of that species.
SC.7.L.16.1:	Understand and explain that every organism requires a set of instructions that specifies its traits, that this hereditary information (DNA) contains genes located in the chromosomes of each cell, and that heredity is the passage of these instructions from one generation to another.
SC.7.L.16.2:	Determine the probabilities for genotype and phenotype combinations using Punnett Squares and pedigrees.
SC.7.L.16.3:	Compare and contrast the general processes of sexual reproduction requiring meiosis and asexual reproduction requiring mitosis.
SC.7.L.16.4:	Recognize and explore the impact of biotechnology (cloning, genetic engineering, artificial selection) on the individual, society and the environment.
SC.7.L.17.1:	Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.
SC.7.L.17.2:	Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism.
SC.7.L.17.3:	Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.
SC.7.N.1.1:	Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.7.N.1.2:	Differentiate replication (by others) from repetition (multiple trials).
SC.7.N.1.3:	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.
SC.7.N.1.4:	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.
SC.7.N.1.5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.
SC.7.N.1.6:	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.
SC.7.N.1.7:	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.
SC.7.N.2.1:	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.
SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.
SC.7.N.3.2:	Identify the benefits and limitations of the use of scientific models.
SC.7.P.10.1:	Illustrate that the sun's energy arrives as radiation with a wide range of wavelengths, including infrared, visible, and ultraviolet, and that white light is made up of a spectrum of many different colors.
SC.7.P.10.2:	Observe and explain that light can be reflected, refracted, and/or absorbed.
SC.7.P.10.3:	Recognize that light waves, sound waves, and other waves move at different speeds in different materials.
SC.7.P.11.1:	Recognize that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state.
SC.7.P.11.2:	Investigate and describe the transformation of energy from one form to another.
SC.7.P.11.3:	Cite evidence to explain that energy cannot be created nor destroyed, only changed from one form to another.
SC.7.P.11.4:	Observe and describe that heat flows in predictable ways, moving from warmer objects to cooler ones until they reach the same temperature.
SC.8.E.5.1:	Recognize that there are enormous distances between objects in space and apply our knowledge of light and space travel to understand this distance.
SC.8.E.5.2:	Recognize that the universe contains many billions of galaxies and that each galaxy contains many billions of stars.
SC.8.E.5.3:	Distinguish the hierarchical relationships between planets and other astronomical bodies relative to solar system, galaxy, and universe, including distance, size, and composition.
SC.8.E.5.4:	Explore the Law of Universal Gravitation by explaining the role that gravity plays in the formation of planets, stars, and solar systems and in determining their motions.
SC.8.E.5.5:	Describe and classify specific physical properties of stars: apparent magnitude (brightness), temperature (color), size, and luminosity (absolute brightness).
SC.8.E.5.6:	Create models of solar properties including: rotation, structure of the Sun, convection, sunspots, solar flares, and prominences.

SC.8.E.5.7:	Compare and contrast the properties of objects in the Solar System including the Sun, planets, and moons to those of Earth, such as gravitational
	force, distance from the Sun, speed, movement, temperature, and atmospheric conditions.
SC.8.E.5.8:	Compare various historical models of the solar system, including geocentric and heliocentric.
	Explain the Impact of objects in space on each other including:
SC.8.E.5.9:	 the borrow the Earth, including phases, tides, and eclipses, and the relative position of each body.
SC.8.E.5.10:	Assess how technology is essential to science for such purposes as access to outer space and other remote locations, sample collection, measurement, data collection and storage, computation, and communication of information.
SC.8.E.5.11:	Identify and compare characteristics of the electromagnetic spectrum such as wavelength, frequency, use, and hazards and recognize its application to an understanding of planetary images and satellite photographs.
SC.8.E.5.12:	Summarize the effects of space exploration on the economy and culture of Florida.
SC.8.L.18.1:	Describe and investigate the process of photosynthesis, such as the roles of light, carbon dioxide, water and chlorophyll; production of food; release of oxygen.
SC.8.L.18.2:	Describe and investigate how cellular respiration breaks down food to provide energy and releases carbon dioxide.
SC.8.L.18.3:	Construct a scientific model of the carbon cycle to show how matter and energy are continuously transferred within and between organisms and their
SC 01 10 4:	physical environment.
50.8.L.18.4:	Cite evidence that living systems follow the Laws of Conservation of Mass and Energy.
SC.8.N.1.1:	scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.8.N.2.1:	Distinguish between scientific and pseudoscientific ideas.
SC.8.N.2.2:	Discuss what characterizes science and its methods.
SC.8.N.3.1:	Select models useful in relating the results of their own investigations.
SC.8.N.3.2:	Explain why theories may be modified but are rarely discarded.
SC.8.N.4.1:	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.
SC.8.N.4.2:	Explain how political, social, and economic concerns can affect science, and vice versa.
SC.8.P.9.1:	Explore the Law of Conservation of Mass by demonstrating and concluding that mass is conserved when substances undergo physical and chemical changes.
SC.8.P.9.2:	Differentiate between physical changes and chemical changes.
SC.8.P.9.3:	Investigate and describe how temperature influences chemical changes.
SC.912.E.6.1:	Describe and differentiate the layers of Earth and the interactions among them.
SC.912.E.6.2:	Connect surface features to surface processes that are responsible for their formation.
SC.912.E.6.3:	Analyze the scientific theory of plate tectonics and identify related major processes and features as a result of moving plates.
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.16.16:	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of
SC 912 17 6 [.]	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism
	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels
SC.912.L.17.9:	and the reduction of available energy at successive trophic levels.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.
SC.912.P.8.4:	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC.912.P.8.5:	Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.
SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.
LAFS.68.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts.
LAFS.68.RST.1.2:	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
LAFS.68.RST.1.3: LAFS.68.RST.2.4:	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.
LAFS.68.RST.2.5:	Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.
LAFS.68.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
LAFS.68.RST.3.7:	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LAFS.68.RST.3.8:	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
LAFS.68.RST.3.9:	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
LAFS.68.RST.4.10:	By the end of grade 8, read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently.
	Write arguments focused on <i>discipline-specific content</i> . a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.
	b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using
	credible sources

	 c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style.
	e. Provide a concluding statement or section that follows from and supports the argument presented.
LAFS.68.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples. c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to inform about or explain the topic. e. Establish and maintain a formal style and objective tone. f. Provide a concluding statement or section that follows from and supports the information or explanation presented.
LAFS.68.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.68.WHST.2.5:	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
LAFS.68.WHST.2.6:	Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.
LAFS.68.WHST.3.7:	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
LAFS.68.WHST.3.8:	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
LAFS.68.WHST.3.9: LAFS.68.WHST.4.10:	Draw evidence from informational texts to support analysis reflection, and research. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipling specific tasks, purposes, and audiences
LAFS.8.SL.1.1:	 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. b. Follow rules for collegial discussions and decision-making, track progress toward specific goals and deadlines, and define individual roles as needed. c. Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas. d. Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented.
LAFS.8.SL.1.2:	Analyze the purpose of information presented in diverse media and formats (e.g., visually, quantitatively, orally) and evaluate the motives (e.g., social, commercial, political) behind its presentation
LAFS.8.SL.1.3:	Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and relevance and sufficiency of the evidence and identifying when irrelevant evidence is introduced.
LAFS.8.SL.2.4:	Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well- chosen details: use appropriate eve contact, adequate volume, and clear pronunciation.
LAFS.8.SL.2.5:	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.
MAFS.8.F.2.5:	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
MAFS.8.G.3.9:	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. Clarifications: Fluency Expectations or Examples of Culminating Standards When students learn to solve problems involving volumes of cones, cylinders, and spheres — together with their previous grade 7 work in angle measure, area, surface area and volume (7.G.2.4–2.6) — they will have acquired a well-developed set of geometric measurement skills. These skills, along with proportional reasoning (7.RP) and multistep numerical problem solving (7.EE.2.3), can be combined and used in flexible ways as part of modeling during high school — not to mention after high school for college and careers.
MAFS.8.SP.1.4:	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. <i>For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?</i>
MAFS.K12.MP.1.1:	Wake sense or problems and persevere in solving them. Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting Reason abstractly and quantitatively.
	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to been an archiver a given situation and concernant it comballically

MAFS.K12.MP.2.1:	and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting Model with mathematics
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
MAFS.K12.MP.8.1:	Look for and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results. Standard Relation to Course: Supporting
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
HE.7.C.1.4:	Clarifications: Helmet use, seat-belt use, pedestrian safety, unsupervised handling of firearms, and proper use of over-the-counter medications.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2002085

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: M/J COMPSCI2 ACC HON Course Length: Year (Y) Course Attributes: • Class Size Core Required Course Level: 3

Course Status: Course Approved Grade Level(s): 6,7,8

Educator Certifications

Biology (Grades 6-12) Earth/Space Science (Grades 6-12) Middle Grades General Science (Middle Grades 5-9) Chemistry (Grades 6-12) Physics (Grades 6-12)

Science (Secondary Grades 7-12)

M/J Comprehensive Science 2 Accelerated Honors (#2002085) 2022 - And Beyond

Name	Description
SC.7.E.6.1:	Describe the layers of the solid Earth, including the lithosphere, the hot convecting mantle, and the dense metallic liquid and solid cores.
SC.7.E.6.2:	Identify the patterns within the rock cycle and relate them to surface events (weathering and erosion) and sub-surface events (plate tectonics and mountain building).
SC.7.E.6.3:	Identify current methods for measuring the age of Earth and its parts, including the law of superposition and radioactive dating.
SC.7.E.6.4:	Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes.
SC.7.E.6.5:	Explore the scientific theory of plate tectonics by describing how the movement of Earth's crustal plates causes both slow and rapid changes in Earth's surface, including volcanic eruptions, earthquakes, and mountain building.
SC.7.E.6.6:	Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.
SC.7.E.6.7:	Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean basins.
SC.7.L.15.1:	Recognize that fossil evidence is consistent with the scientific theory of evolution that living things evolved from earlier species.
SC.7.L.15.2:	Explore the scientific theory of evolution by recognizing and explaining ways in which genetic variation and environmental factors contribute to evolution by natural selection and diversity of organisms.
SC.7.L.15.3:	Explore the scientific theory of evolution by relating how the inability of a species to adapt within a changing environment may contribute to the extinction of that species.
SC.7.L.16.1:	Understand and explain that every organism requires a set of instructions that specifies its traits, that this hereditary information (DNA) contains genes located in the chromosomes of each cell, and that heredity is the passage of these instructions from one generation to another.
SC.7.L.16.2:	Determine the probabilities for genotype and phenotype combinations using Punnett Squares and pedigrees.
SC.7.L.16.3:	Compare and contrast the general processes of sexual reproduction requiring meiosis and asexual reproduction requiring mitosis.
SC.7.L.16.4:	Recognize and explore the impact of biotechnology (cloning, genetic engineering, artificial selection) on the individual, society and the environment.
SC.7.L.17.1:	Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.
SC.7.L.17.2:	Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism.
SC.7.L.17.3:	Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.
SC.7.N.1.1:	Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.7.N.1.2:	Differentiate replication (by others) from repetition (multiple trials).
SC.7.N.1.3:	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.
SC.7.N.1.4:	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.
SC.7.N.1.5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.
SC.7.N.1.6:	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.
SC.7.N.1.7:	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.
SC.7.N.2.1:	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.
SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.
SC.7.N.3.2:	Identify the benefits and limitations of the use of scientific models.
SC.7.P.10.1:	Illustrate that the sun's energy arrives as radiation with a wide range of wavelengths, including infrared, visible, and ultraviolet, and that white light is made up of a spectrum of many different colors.
SC.7.P.10.2:	Observe and explain that light can be reflected, refracted, and/or absorbed.
SC.7.P.10.3:	Recognize that light waves, sound waves, and other waves move at different speeds in different materials.
SC.7.P.11.1:	Recognize that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state.
SC.7.P.11.2:	Investigate and describe the transformation of energy from one form to another.
SC.7.P.11.3:	Cite evidence to explain that energy cannot be created nor destroyed, only changed from one form to another.
SC.7.P.11.4:	Observe and describe that heat flows in predictable ways, moving from warmer objects to cooler ones until they reach the same temperature.
SC.8.E.5.1:	Recognize that there are enormous distances between objects in space and apply our knowledge of light and space travel to understand this distance.
SC.8.E.5.2:	Recognize that the universe contains many billions of galaxies and that each galaxy contains many billions of stars.
SC.8.E.5.3:	Distinguish the hierarchical relationships between planets and other astronomical bodies relative to solar system, galaxy, and universe, including distance, size, and composition.
SC.8.E.5.4:	Explore the Law of Universal Gravitation by explaining the role that gravity plays in the formation of planets, stars, and solar systems and in determining their motions.
SC.8.E.5.5:	Describe and classify specific physical properties of stars: apparent magnitude (brightness), temperature (color), size, and luminosity (absolute brightness).
SC.8.E.5.6:	Create models of solar properties including: rotation, structure of the Sun, convection, sunspots, solar flares, and prominences.
SC.8.E.5.7:	Compare and contrast the properties of objects in the Solar System including the Sun, planets, and moons to those of Earth, such as gravitational force, distance from the Sun, speed, movement, temperature, and atmospheric conditions.
------------------	---
SC.8.E.5.8:	Compare various historical models of the Solar System, including geocentric and heliocentric.
	Explain the impact of objects in space on each other including:
SC.8.E.5.9:	1. the Sun on the Earth including seasons and gravitational attraction
	2. the Moon on the Earth, including phases, tides, and eclipses, and the relative position of each body.
SC.8.E.5.10:	Assess how technology is essential to science for such purposes as access to outer space and other remote locations, sample collection,
	Identify and compare characteristics of the electromagnetic spectrum such as wavelength frequency, use, and bazards and recognize its application.
SC.8.E.5.11:	to an understanding of planetary images and satellite photographs.
SC.8.E.5.12:	Summarize the effects of space exploration on the economy and culture of Florida.
SC.8.L.18.1:	Describe and investigate the process of photosynthesis, such as the roles of light, carbon dioxide, water and chlorophyll; production of food; release
SC.8.1.18.2:	Describe and investigate how cellular respiration breaks down food to provide energy and releases carbon dioxide.
CO. 0. L. 10. 0.	Construct a scientific model of the carbon cycle to show how matter and energy are continuously transferred within and between organisms and their
SC.8.L.18.3:	physical environment.
SC.8.L.18.4:	Cite evidence that living systems follow the Laws of Conservation of Mass and Energy.
SC.8.N.1.1:	Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.8.N.2.1:	Distinguish between scientific and pseudoscientific ideas.
SC.8.N.2.2:	Discuss what characterizes science and its methods.
SC.8.N.3.1:	Select models useful in relating the results of their own investigations.
SC.8.N.3.2:	Explain why theories may be modified but are rarely discarded.
SC.8.N.4.1:	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.
SC.8.N.4.2:	Explain how political, social, and economic concerns can affect science, and vice versa.
SC.8.P.9.1:	changes.
SC.8.P.9.2:	Differentiate between physical changes and chemical changes.
SC.8.P.9.3:	Investigate and describe how temperature influences chemical changes.
SC.912.E.6.1:	Describe and differentiate the layers of Earth and the interactions among them.
SC.912.E.6.2:	Connect surface features to surface processes that are responsible for their formation.
SC.912.E.6.3:	Analyze the scientific theory of plate tectonics and identify related major processes and features as a result of moving plates.
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
SC.912.L.15.13:	result in differential reproductive success.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.16.16:	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.
SC.912.L.17.6:	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.
SC.912.P.8.4:	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC.912.P.8.5:	Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.
SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.
	Analyze the problem in a way that makes sense given the task
	 Ask questions that will help with solving the task.
	Build perseverance by modifying methods as needed while solving a challenging task.
	Stay engaged and maintain a positive mindset when working to solve tasks.
	Help and support each other when attempting a new method or approach.
MA.K12.MTR.1.1:	Clarifications:
	Teachers who encourage students to participate actively in effortful learning both individually and with others:
	Cultivate a community of growth mindset learners.
	 Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to apply a problem solving.
	Becognize students' effort when solving challenging problems
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:
	Build understanding through modeling and using manipulatives.
	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
	Progress from modeling problems with objects and drawings to using algorithms and equations.

MA.K12.MTR.2.1:	 Express connections between concepts and representations. Choose a representation based on the given context or purpose.
	 Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	 Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.
MA.K12.MTR.5.1:	 Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems

	 Perform investigations to gather data or determine if a method is appropriate. Redesign models and methods to improve accuracy or efficiency.
	 Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
ELA.K12.EE.1.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension.
	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
	Describe ways to reduce or prevent injuries and adolescent health problems.
HE.7.C.1.4:	Clarifications: Helmet use, seat-belt use, pedestrian safety, unsupervised handling of firearms, and proper use of over-the-counter medications.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate

critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION	
Course Number: 2002085	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: General Sciences >
	Abbreviated Title: M/J COMPSCI2 ACC HON
	Course Length: Year (Y)
	Course Attributes:
	Class Size Core Required
	Course Level: 3
Course Status: State Board Approved	
Grade Level(s): 6,7,8	

Biology (Grades 6-12)
Earth/Space Science (Grades 6-12)
Middle Grades General Science (Middle Grades 5-9)
Chemistry (Grades 6-12)
Physics (Grades 6-12)
Science (Secondary Grades 7-12)

M/J Science 2 Cambridge Lower Secondary (#2002086) 2014 - 2022 (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-secondary-1/cambridge-secondary-1/curriculum/

GENERAL INFORMATION

Course Number: 2002086

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: M/J SCI 2 CLS Course Length: Year (Y) **Course Attributes:** Advanced International Certificate of Education (AICE) Course Level: 3

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 6,7,8

Biology (Grades 6-12)
Earth/Space Science (Grades 6-12)
Middle Grades General Science (Middle Grades 5-9)
Chemistry (Grades 6-12)
Physics (Grades 6-12)
Science (Secondary Grades 7-12)

M/J Science 2 Cambridge Lower Secondary (#2002086) 2022 - And Beyond

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-secondary-1/cambridge-secondary-1/curriculum/

> Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education

> Courses > Subject: Science > SubSubject: General

• Advanced International Certificate of Education

Abbreviated Title: M/J SCI 2 CLS Course Length: Year (Y) **Course Attributes:**

Sciences >

(AICE)

Course Level: 3

GENERAL INFORMATION

Course Number: 2002086

Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): 6,7,8

Biology (Grades 6-12)
arth/Space Science (Grades 6-12)
Aiddle Grades General Science (Middle Grades 5-9)
Chemistry (Grades 6-12)
hysics (Grades 6-12)
cience (Secondary Grades 7-12)

M/J International Baccalaureate MYP Comprehensive Science 2 (#2002090) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at: http://www.ibo.org/en/programmes/

GENERAL INFORMATION

Course Number: 2002090

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: M/J IB MYP COMP SCI2 Course Length: Year (Y) Course Attributes: • International Baccalaureate (IB) Course Level: 3

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 6,7,8

Educator Certifications

Science (Elementary Grades 1-6) Science (Secondary Grades 7-12) Middle Grades Integrated Curriculum (Middle Grades 5-9) Chemistry (Grades 6-12) Biology (Grades 6-12) Middle Grades General Science (Middle Grades 5-9) Physics (Grades 6-12) Earth/Space Science (Grades 6-12)

M/J Comprehensive Science 3 (#2002100) 2015 - 2022 (current)

Name	Description
SC.8.E.5.1:	Recognize that there are enormous distances between objects in space and apply our knowledge of light and space travel to understand this distance.
SC.8.E.5.2:	Recognize that the universe contains many billions of galaxies and that each galaxy contains many billions of stars.
SC.8.E.5.3:	Distinguish the hierarchical relationships between planets and other astronomical bodies relative to solar system, galaxy, and universe, including distance, size, and composition.
SC.8.E.5.4:	Explore the Law of Universal Gravitation by explaining the role that gravity plays in the formation of planets, stars, and solar systems and in determining their motions.
SC.8.E.5.5:	Describe and classify specific physical properties of stars: apparent magnitude (brightness), temperature (color), size, and luminosity (absolute brightness).
SC.8.E.5.6:	Create models of solar properties including: rotation, structure of the Sun, convection, sunspots, solar flares, and prominences.
SC.8.E.5.7:	Compare and contrast the properties of objects in the Solar System including the Sun, planets, and moons to those of Earth, such as gravitational force, distance from the Sun, speed, movement, temperature, and atmospheric conditions.
SC.8.E.5.8:	Compare various historical models of the Solar System, including geocentric and heliocentric.
	Explain the impact of objects in space on each other including:
SC.8.E.5.9:	 the Sun on the Earth including seasons and gravitational attraction the Magnetic the Earth including seasons and gravitational attraction
	the Moon on the Earth, including phases, tides, and eclipses, and the relative position of each body.
SC.8.E.5.10:	Assess how technology is essential to science for such purposes as access to outer space and other remote locations, sample collection, measurement, data collection and storage, computation, and communication of information.
SC.8.E.5.11:	Identify and compare characteristics of the electromagnetic spectrum such as wavelength, frequency, use, and hazards and recognize its application to an understanding of planetary images and satellite photographs.
SC.8.E.5.12:	Summarize the effects of space exploration on the economy and culture of Florida.
SC.8.L.18.1:	Describe and investigate the process of photosynthesis, such as the roles of light, carbon dioxide, water and chlorophyll; production of food; release of oxygen.
SC.8.L.18.2:	Describe and investigate how cellular respiration breaks down food to provide energy and releases carbon dioxide.
SC.8.L.18.3:	Construct a scientific model of the carbon cycle to show how matter and energy are continuously transferred within and between organisms and their
	physical environment.
SC.8.L.18.4:	Cite evidence that living systems follow the Laws of Conservation of Mass and Energy.
SC.8.N.1.1:	befine a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charter tables, and graphics, analyze information, make predictions, and defend expelivious.
SC 8 N 1 2	Design and conduct a study using repeated trials and replication
SC.8.N.1.3:	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.
SC.8.N.1.4:	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.
SC.8.N.1.6:	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
SC.8.N.2.1:	Distinguish between scientific and pseudoscientific ideas.
SC.8.N.2.2:	Discuss what characterizes science and its methods.
SC.8.N.3.1:	Select models useful in relating the results of their own investigations.
SC.8.N.3.2:	Explain why theories may be modified but are rarely discarded.
SC.8.N.4.1:	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.
SC.8.N.4.2:	Explain how political, social, and economic concerns can affect science, and vice versa.
SC.8.P.8.1:	Explore the scientific theory of atoms (also known as atomic theory) by using models to explain the motion of particles in solids, liquids, and gases.
SC.8.P.8.2:	Differentiate between weight and mass recognizing that weight is the amount of gravitational pull on an object and is distinct from, though proportional to, mass.
SC.8.P.8.3:	Explore and describe the densities of various materials through measurement of their masses and volumes.
SC.8.P.8.4:	Classify and compare substances on the basis of characteristic physical properties that can be demonstrated or measured; for example, density, thermal or electrical conductivity, solubility, magnetic properties, melting and boiling points, and know that these properties are independent of the amount of the sample.
SC.8.P.8.5:	Recognize that there are a finite number of elements and that their atoms combine in a multitude of ways to produce compounds that make up all of the living and nonliving things that we encounter.
SC.8.P.8.6:	Recognize that elements are grouped in the periodic table according to similarities of their properties.
SC.8.P.8.7:	Explore the scientific theory of atoms (also known as atomic theory) by recognizing that atoms are the smallest unit of an element and are composed of sub-atomic particles (electrons surrounding a nucleus containing protons and neutrons).
SC.8.P.8.8:	Identify basic examples of and compare and classify the properties of compounds, including acids, bases, and salts.
SC.8.P.8.9:	Distinguish among mixtures (including solutions) and pure substances.
SC.8.P.9.1:	Explore the Law of Conservation of Mass by demonstrating and concluding that mass is conserved when substances undergo physical and chemical changes.
SC.8.P.9.2:	Differentiate between physical changes and chemical changes.
SC.8.P.9.3:	Investigate and describe how temperature influences chemical changes.

LAFS.68.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts.
LAFS.68.RST.1.2:	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
LAFS.68.RST.1.3:	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LAFS 68 RST 2-4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical
E 11 0.00.110 1.2. 1.	context relevant to grades 6–8 texts and topics.
LAFS.68.RST.2.5:	Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the
Ι ΔΕS 68 RST 2 6·	lopic. Analyze the author's nurnose in providing an explanation, describing a procedure, or discussing an experiment in a text
EAT 5.00.1(31.2.0.	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart
LAFS.68.RST.3.7:	diagram, model, graph, or table).
LAFS.68.RST.3.8:	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
LAFS 68 RST 3 9	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on
EAT 5.00.1(51.5.7.	the same topic.
LAFS.68.RST.4.10:	By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.
LAFS.68.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports the argument presented.
	Write informative/evolgentary texts, including the parration of historical events, scientific precedures/ evolgenments, or technical precessor
	a Introduce a topic clearly, previewing what is to follow: organize ideas, concepts, and information into broader categories as appropriate to
	achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.
	b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.
LAFS.68.WHST.1.2:	c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.
	d. Use precise language and domain-specific vocabulary to inform about or explain the topic.
	e. Establish and maintain a formal style and objective tone.
	 Provide a concluding statement or section that follows from and supports the information or explanation presented.
LAFS.68.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.68.WHST.2.5:	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
LAFS.68.WHST.2.6:	Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.
LAFS.68.WHST.3.7:	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
LAFS 68 WHST 3.8	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each
En 0.00.00101.0.0.	source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
LAFS.68.WHST.3.9:	Draw evidence from informational texts to support analysis reflection, and research.
LAFS.68.WHST.4.10:	write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences
	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and
	issues, building on others' ideas and expressing their own clearly.
	a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on
	the topic, text, or issue to probe and reflect on ideas under discussion.
LAFS.8.SL.1.1:	b. Follow rules for collegial discussions and decision-making, track progress toward specific goals and deadlines, and define individual roles as
	needed.
	c. Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations,
	d Acknowledge new information expressed by others, and when warranted, qualify or justify their own views in light of the evidence presented
LAFS.8.SL.1.2:	Analyze the purpose of information presented in diverse media and formats (e.g., visually, quantitatively, orally) and evaluate the motives (e.g., social
	commercial, political) behind its presentation.
LAFS.8.SL.1.3:	identifying when irrelevant evidence is introduced
	Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-
LAFS.8.SL.2.4:	chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.
LAFS.8.SL.2.5:	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.
MAFS.8.F.2.5:	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing,
	linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
	Clarifications:
	indency expectations of examples of culturating standards
MAFS.8.G.3.9:	When students learn to solve problems involving volumes of cones, cylinders, and spheres — together with their previous grade 7 work in angle
	measure, area, surface area and volume (7.G.2.4-2.6) — they will have acquired a well-developed set of geometric measurement skills. These
	skills, along with proportional reasoning (7.RP) and multistep numerical problem solving (7.EE.2.3), can be combined and used in flexible ways as
	part of modeling during high school — not to mention after high school for college and careers.
	Make sense of problems and persevere in solving them.
l i i i i i i i i i i i i i i i i i i i	

MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting Model with mathematics
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting
MAFS.K12.MP.5.1:	Use appropriate tools strategically. Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting

	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results. Standard Relation to Course: Supporting
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Additional content that may be included in the Grade 8 NAEP Science assessment includes:

- Rocks and rock formations bear evidence of the minerals, materials, temperature/pressure conditions, and forces that created them. (SC.4.E.6.1 and SC.4.E.6.2)
- Earth as a whole has a magnetic field that is detectable at the surface with a compass, with north and south poles and lines of force. (SC.912.P.10.16)
- The Sun is the major source of energy for phenomena on Earth's surface. (SC.3.L.17.2; SC.3.E.5.2; SC.3.E.6.1; SC.4.P.10.4; SC.4.L.17.2)
- Water, which covers the majority of Earth's surface, circulates through the crust, oceans, and atmosphere in what is known as the water cycle. (SC.5.E.7.1; SC.5.E.7.2; SC.5.E.7.6)
- A tiny fraction of the light energy from the Sun is Earth's primary source of energy, heating Earth surfaces and providing the energy that results in wind, ocean currents, and storms. (SC.2.E.7.2; SC.3.E.6.1)
- Following fertilization, cell division produces a small cluster of cells that then differentiate by appearance and function to form the basic tissues of an embryo. (SC.912.L.16.13)
- Characteristics of organisms are influenced by heredity and environment. (SC.4.L.16.2 and SC.4.L.16.3)
- Nuclear reactions take place in the Sun. (SC.912.P.10.10; SC.912.P.10.11)

The NAEP frameworks for Science may be accessed at http://www.nagb.org/publications/frameworks/science-09.pdf

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:

https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection: http://www.fasa.net/4DCGI/cms/review.html?Action=CMS_Document&DocID=139

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: M/J COMP SCI 3 Course Length: Year (Y) Course Attributes: • Class Size Core Required Course Level: 2

Course Status: Course Approved Grade Level(s): 6,7,8

Science (Secondary Grades 7-12)	
Middle Grades Integrated Curriculum (Middle Grades 5-9)	
Physics (Grades 6-12)	
Earth/Space Science (Grades 6-12)	
Middle Grades General Science (Middle Grades 5-9)	
Chemistry (Grades 6-12)	
Biology (Grades 6-12)	

M/J Comprehensive Science 3 (#2002100) 2022 - And Beyond

Name	Description
SC.8.E.5.1:	Recognize that there are enormous distances between objects in space and apply our knowledge of light and space travel to understand this distance.
SC.8.E.5.2:	Recognize that the universe contains many billions of galaxies and that each galaxy contains many billions of stars.
SC.8.E.5.3:	Distinguish the hierarchical relationships between planets and other astronomical bodies relative to solar system, galaxy, and universe, including distance, size, and composition.
SC.8.E.5.4:	Explore the Law of Universal Gravitation by explaining the role that gravity plays in the formation of planets, stars, and solar systems and in determining their motions.
SC.8.E.5.5:	Describe and classify specific physical properties of stars: apparent magnitude (brightness), temperature (color), size, and luminosity (absolute brightness).
SC.8.E.5.6:	Create models of solar properties including: rotation, structure of the Sun, convection, sunspots, solar flares, and prominences.
SC.8.E.5.7:	Compare and contrast the properties of objects in the Solar System including the Sun, planets, and moons to those of Earth, such as gravitational force, distance from the Sun, speed, movement, temperature, and atmospheric conditions.
SC.8.E.5.8:	Compare various historical models of the Solar System, including geocentric and heliocentric.
	Explain the impact of objects in space on each other including:
SC.8.E.5.9:	 the Sun on the Earth including seasons and gravitational attraction the Moon on the Earth, including phases, tides, and eclipses, and the relative position of each body.
SC.8.E.5.10:	Assess how technology is essential to science for such purposes as access to outer space and other remote locations, sample collection, measurement, data collection and storage, computation, and communication of information.
SC.8.E.5.11:	Identify and compare characteristics of the electromagnetic spectrum such as wavelength, frequency, use, and hazards and recognize its application to an understanding of planetary images and satellite photographs.
SC.8.E.5.12:	Summarize the effects of space exploration on the economy and culture of Florida.
SC.8.L.18.1:	Describe and investigate the process of photosynthesis, such as the roles of light, carbon dioxide, water and chlorophyll; production of food; release of oxygen.
SC.8.L.18.2:	Describe and investigate how cellular respiration breaks down food to provide energy and releases carbon dioxide.
SC.8.L.18.3:	Construct a scientific model of the carbon cycle to show how matter and energy are continuously transferred within and between organisms and their physical environment.
SC.8.L.18.4:	Cite evidence that living systems follow the Laws of Conservation of Mass and Energy.
SC.8.N.1.1:	Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.8.N.1.2:	Design and conduct a study using repeated trials and replication.
SC.8.N.1.3:	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.
SC.8.N.1.4:	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.
SC.8.N.1.6:	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
SC.8.N.2.1:	Distinguish between scientific and pseudoscientific ideas.
SC.8.N.2.2:	Discuss what characterizes science and its methods.
SC.8.N.3.1:	Select models userul in relating the results of their own investigations.
SC.8.N.4.1:	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.
SC.8.N.4.2:	Explain how political, social, and economic concerns can affect science, and vice versa.
SC.8.P.8.1:	Explore the scientific theory of atoms (also known as atomic theory) by using models to explain the motion of particles in solids, liquids, and gases.
SC.8.P.8.2:	Differentiate between weight and mass recognizing that weight is the amount of gravitational pull on an object and is distinct from, though proportional to, mass.
SC.8.P.8.3:	Explore and describe the densities of various materials through measurement of their masses and volumes.
SC.8.P.8.4:	Classify and compare substances on the basis of characteristic physical properties that can be demonstrated or measured; for example, density, thermal or electrical conductivity, solubility, magnetic properties, melting and boiling points, and know that these properties are independent of the amount of the sample.
SC.8.P.8.5:	Recognize that there are a finite number of elements and that their atoms combine in a multitude of ways to produce compounds that make up all of the living and nonliving things that we encounter.
SC.8.P.8.6:	Recognize that elements are grouped in the periodic table according to similarities of their properties.
SC.8.P.8.7:	Explore the scientific theory of atoms (also known as atomic theory) by recognizing that atoms are the smallest unit of an element and are composed of sub-atomic particles (electrons surrounding a nucleus containing protons and neutrons).
SC.8.P.8.8:	Identify basic examples of and compare and classify the properties of compounds, including acids, bases, and salts.
SC.8.P.8.9:	Distinguish among mixtures (including solutions) and pure substances.
SC.8.P.9.1:	Explore the Law of Conservation of Mass by demonstrating and concluding that mass is conserved when substances undergo physical and chemical changes.
SC.8.P.9.2:	Differentiate between physical changes and chemical changes.
SC.8.P.9.3:	Investigate and describe how temperature influences chemical changes.

MA K12 MTR.1.1:	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach.
MA.K I 2.MHR. I . I :	 Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	 Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.

	Mathematicians who assess the reasonableness of solutions:
	Estimate to discover possible solutions.
	Use benchmark quantities to determine if a solution makes sense.
	 Check calculations when solving problems. Verify possible solutions by explaining the methods used
MA.K12.MTR.6.1:	Evaluate results based on the given context.
	Clarifications:
	Teachers who encourage students to assess the reasonableness of solutions:
	 Have students estimate or predict solutions prior to solving. Prompt students to continually ask "Does this solution make sense? How do you know?"
	 Reinforce that students check their work as they progress within and after a task.
	Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts.
	Mathematicians who apply mathematics to real-world contexts:
	Connect mathematical concepts to everyday experiences.
	 Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate • Redesign models and methods to improve accuracy or
	efficiency.
MA.K12.MTR.7.1:	Clarifications:
	Teachers who encourage students to apply mathematics to real-world contexts:
	 Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods.
	 Support students as they validate conclusions by comparing them to the given situation.
	Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	Clarifications:
	K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.
	2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In
	3rd grade, students should use a combination of direct and indirect citations.
ELA.KTZ.EE.T.T:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly
	quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style quide to create a proper citation
	9.12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ
	7 12 statemes continue with provides statis and should be aware or chisting style galacs and the ways in which they amer.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
	Clarifications:
ELA.K12.EE.3.1:	Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the
	girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
	Clarifications:
	In kindergarten, students learn to listen to one another respectfully.
ELA.K12.EE.4.1:	In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3.12 students engage in academic conversations discussing claims and justifying their reasoning refining and applying skills
	Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Ose the accepted rules governing a specific format to create quality work.
	Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they
	must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to
	do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Charmications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends
	differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Additional content that may be included in the Grade 8 NAEP Science assessment includes:

- Rocks and rock formations bear evidence of the minerals, materials, temperature/pressure conditions, and forces that created them. (SC.4.E.6.1 and SC.4.E.6.2)
- Earth as a whole has a magnetic field that is detectable at the surface with a compass, with north and south poles and lines of force. (SC.912.P.10.16)
- The Sun is the major source of energy for phenomena on Earth's surface. (SC.3.L.17.2; SC.3.E.5.2; SC.3.E.6.1; SC.4.P.10.4; SC.4.L.17.2)
- Water, which covers the majority of Earth's surface, circulates through the crust, oceans, and atmosphere in what is known as the water cycle. (SC.5.E.7.1; SC.5.E.7.2; SC.5.E.7.6)
- A tiny fraction of the light energy from the Sun is Earth's primary source of energy, heating Earth surfaces and providing the energy that results in wind, ocean currents, and storms. (SC.2.E.7.2; SC.3.E.6.1)
- Following fertilization, cell division produces a small cluster of cells that then differentiate by appearance and function to form the basic tissues of an embryo. (SC.912.L.16.13)
- Characteristics of organisms are influenced by heredity and environment. (SC.4.L.16.2 and SC.4.L.16.3)
- Nuclear reactions take place in the Sun. (SC.912.P.10.10; SC.912.P.10.11)

The NAEP frameworks for Science may be accessed at http://www.nagb.org/publications/frameworks/science-09.pdf.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection: http://www.fasa.net/4DCGI/cms/review.html?Action=CMS_Document&DocID=139

GENERAL INFORMATION	
	Course Path: Section: Grades PreK to 12 Education
Course Number 2002100	Courses > Grade Group: Grades 6 to 8 Education
Course Number: 2002100	Courses > Subject: Science > SubSubject: General
	Sciences >
	Abbreviated Title: M/J COMP SCI 3
	Course Length: Year (Y)

Course Attributes: • Class Size Core Required Course Level: 2

Course Status: State Board Approved Grade Level(s): 6,7,8

Educator Certifications

Science (Secondary Grades 7-12) Middle Grades Integrated Curriculum (Middle Grades 5-9) Physics (Grades 6-12) Earth/Space Science (Grades 6-12) Middle Grades General Science (Middle Grades 5-9) Chemistry (Grades 6-12) Biology (Grades 6-12)

M/J Comprehensive Science 3, Advanced (#2002110) 2015 - 2022 (current)

Name	Description
SC.8.E.5.1:	Recognize that there are enormous distances between objects in space and apply our knowledge of light and space travel to understand this distance.
SC.8.E.5.2:	Recognize that the universe contains many billions of galaxies and that each galaxy contains many billions of stars.
SC.8.E.5.3:	Distinguish the hierarchical relationships between planets and other astronomical bodies relative to solar system, galaxy, and universe, including distance, size, and composition.
SC.8.E.5.4:	Explore the Law of Universal Gravitation by explaining the role that gravity plays in the formation of planets, stars, and solar systems and in determining their motions.
SC.8.E.5.5:	Describe and classify specific physical properties of stars: apparent magnitude (brightness), temperature (color), size, and luminosity (absolute brightness).
SC.8.E.5.6:	Create models of solar properties including: rotation, structure of the Sun, convection, sunspots, solar flares, and prominences.
SC.8.E.5.7:	Compare and contrast the properties of objects in the Solar System including the Sun, planets, and moons to those of Earth, such as gravitational force, distance from the Sun, speed, movement, temperature, and atmospheric conditions.
SC.8.E.5.8:	Compare various historical models of the Solar System, including geocentric and heliocentric.
	Explain the impact of objects in space on each other including:
SC.8.E.5.9:	 the Sun on the Earth including seasons and gravitational attraction the Moon on the Earth, including phases, tides, and eclipses, and the relative position of each body.
SC.8.E.5.10:	Assess how technology is essential to science for such purposes as access to outer space and other remote locations, sample collection, measurement, data collection and storage, computation, and communication of information.
SC.8.E.5.11:	Identify and compare characteristics of the electromagnetic spectrum such as wavelength, frequency, use, and hazards and recognize its application to an understanding of planetary images and satellite photographs.
SC.8.E.5.12:	Summarize the effects of space exploration on the economy and culture of Florida.
SC.8.L.18.1:	Describe and investigate the process of photosynthesis, such as the roles of light, carbon dioxide, water and chlorophyll; production of food; release of oxygen.
SC.8.L.18.2:	Describe and investigate how cellular respiration breaks down food to provide energy and releases carbon dioxide.
SC.8.L.18.3:	Construct a scientific model of the carbon cycle to show how matter and energy are continuously transferred within and between organisms and their physical environment.
SC.8.L.18.4:	Cite evidence that living systems follow the Laws of Conservation of Mass and Energy.
SC.8.N.1.1:	Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.8.N.1.2:	Design and conduct a study using repeated trials and replication.
SC.8.N.1.3:	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.
SC.8.N.1.4:	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.
SC.8.N.1.6:	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
SC.8.N.2.1:	Distinguish between scientific and pseudoscientific ideas.
SC.8.N.2.2:	Discuss what characterizes science and its methods.
SC.8.N.3.1:	Select models useful in relating the results of their own investigations.
SC.8.N.3.2:	Explain why theories may be modified but are rarely discarded.
SC.8.N.4.1:	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.
SC.8.N.4.2:	Explain now political, social, and economic concerns can affect science, and vice versa.
SC.8.P.8.2:	Differentiate between weight and mass recognizing that weight is the amount of gravitational pull on an object and is distinct from, though
SC 8 P 8 3	Explore and describe the densities of various materials through measurement of their masses and volumes
	Classify and compare substances on the basis of characteristic physical properties that can be demonstrated or measured; for example, density,
SC.8.P.8.4:	thermal or electrical conductivity, solubility, magnetic properties, melting and boiling points, and know that these properties are independent of the amount of the sample.
SC.8.P.8.5:	Recognize that there are a finite number of elements and that their atoms combine in a multitude of ways to produce compounds that make up all of the living and nonliving things that we encounter.
SC.8.P.8.6:	Recognize that elements are grouped in the periodic table according to similarities of their properties.
SC.8.P.8.7:	Explore the scientific theory of atoms (also known as atomic theory) by recognizing that atoms are the smallest unit of an element and are composed of sub-atomic particles (electrons surrounding a nucleus containing protons and neutrons).
SC.8.P.8.8:	Identify basic examples of and compare and classify the properties of compounds, including acids, bases, and salts.
SC.8.P.8.9:	Distinguish among mixtures (including solutions) and pure substances.

SC.8.P.9.1:	Explore the Law of Conservation of Mass by demonstrating and concluding that mass is conserved when substances undergo physical and chemical changes.
SC.8.P.9.2:	Differentiate between physical changes and chemical changes.
SC.8.P.9.3:	Investigate and describe how temperature influences chemical changes.
SC.912.E.5.4:	Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.
SC.912.P.8.1:	Differentiate among the four states of matter.
SC.912.P.8.4:	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and
SC 012 D 9 5	and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC 912 P 8 7	Interpret formula representations of molecules and compounds in terms of composition and structure
SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.
LAFS.68.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts.
LAFS.68.RST.1.2:	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
LAFS.68.RST.1.3:	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LAFS.68.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.
LAFS.68.RST.2.5:	Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.
LAFS.68.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
LAFS.68.RST.3.7:	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LAFS.68.RST.3.8:	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
LAFS.68.RST.3.9:	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
LAFS.68.RST.4.10:	By the end of grade 8, read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently.
LAFS.68.WHST.1.1:	 a. Introduce claim(s) about a topic of issue, acknowledge and distinguish the claim(s) from alternate of opposing claim(s, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports the argument presented.
LAFS.68.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples. c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to inform about or explain the topic. e. Establish and maintain a formal style and objective tone. f. Provide a concluding statement or section that follows from and supports the information or explanation presented.
LAFS.68.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.68.WHST.2.5:	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
LAFS.68.WHST.2.6:	Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.
LAFS.68.WHST.3.7:	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
LAFS.68.WHST.3.8:	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
LAFS.68.WHST.3.9:	Draw evidence from informational texts to support analysis reflection, and research.
LAFS.68.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
LAFS.8.SL.1.1:	 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. b. Follow rules for collegial discussions and decision-making, track progress toward specific goals and deadlines, and define individual roles as needed. c. Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas. d. Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented.
LAFS.8.SL.1.2:	Analyze the purpose of information presented in diverse media and formats (e.g., visually, quantitatively, orally) and evaluate the motives (e.g., social, commercial, political) behind its presentation.

LAFS.8.SL.1.3:	Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and relevance and sufficiency of the evidence and identifying when irrelevant evidence is introduced.	
LAFS.8.SL.2.4:	Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-	
LAFS.8.SL.2.5:	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.	
MAFS.8.F.2.5:	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	
	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	
	Clarifications: Fluency Expectations or Examples of Culminating Standards	
MAFS.8.G.3.9:	When students learn to solve problems involving volumes of cones, cylinders, and spheres — together with their previous grade 7 work in angle measure, area, surface area and volume (7.G.2.4–2.6) — they will have acquired a well-developed set of geometric measurement skills. These skills, along with proportional reasoning (7.RP) and multistep numerical problem solving (7.E.2.3), can be combined and used in flexible ways as part of modeling during high school — not to mention after high school for college and careers.	
MAFS.8.SP.1.4:	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. <i>For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a surface to the two school nights and whether or not they have assigned chores at home. Is there evidence that those who have</i>	
	Make sense of problems and persevere in solving them.	
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.	
	Standard Relation to Course: Supporting Reason abstractly and quantitatively	
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.	
	Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others.	
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.	
	Standard Relation to Course: Supporting	
MAFS.K12.MP.4.1:	Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.	
	Standard Relation to Course: Supporting	
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to	

	identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.

• Obtaining, evaluating, and communicating information.

Additional content that may be included in the Grade 8 NAEP Science assessment includes:

- Rocks and rock formations bear evidence of the minerals, materials, temperature/pressure conditions, and forces that created them. (SC.4.E.6.1 and SC.4.E.6.2)
- Earth as a whole has a magnetic field that is detectable at the surface with a compass, with north and south poles and lines of force. (SC.912.P.10.16)
- The Sun is the major source of energy for phenomena on Earth's surface. (SC.3.L.17.2; SC.3.E.5.2; SC.3.E.6.1; SC.4.P.10.4; SC.4.L.17.2)
- Water, which covers the majority of Earth's surface, circulates through the crust, oceans, and atmosphere in what is known as the water cycle. (SC.5.E.7.1; SC.5.E.7.2; SC.5.E.7.6)
- A tiny fraction of the light energy from the Sun is Earth's primary source of energy, heating Earth surfaces and providing the energy that results in wind, ocean currents, and storms. (SC.2.E.7.2; SC.3.E.6.1)
- Following fertilization, cell division produces a small cluster of cells that then differentiate by appearance and function to form the basic tissues of an embryo. (SC.912.L.16.13)
- Characteristics of organisms are influenced by heredity and environment. (SC.4.L.16.2 and SC.4.L.16.3)
- Nuclear reactions take place in the Sun. (SC.912.P.10.10; SC.912.P.10.11)

The NAEP frameworks for Science may be accessed at http://www.nagb.org/publications/frameworks/science-09.pdf

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGl/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2002110	Courses > Grade Group: Grades 6 to 8 Education
Course Number: 2002110	Courses > Subject: Science > SubSubject: General
	Sciences >
	Abbreviated Title: M/J COMP SCI 3 ADV
	Course Length: Year (Y)
	Course Attributes:
	Class Size Core Required
	Course Level: 3
Course Status: Course Approved	

Grade Level(s): 6,7,8

Science (Secondary Grades 7-12)
Middle Grades Integrated Curriculum (Middle Grades 5-9)
Physics (Grades 6-12)
Earth/Space Science (Grades 6-12)
Middle Grades General Science (Middle Grades 5-9)
Chemistry (Grades 6-12)
Biology (Grades 6-12)

M/J Comprehensive Science 3, Advanced (#2002110) 2022 - And Beyond

Name	Description
SC.8.E.5.1:	Recognize that there are enormous distances between objects in space and apply our knowledge of light and space travel to understand this distance.
SC.8.E.5.2:	Recognize that the universe contains many billions of galaxies and that each galaxy contains many billions of stars.
SC.8.E.5.3:	Distinguish the hierarchical relationships between planets and other astronomical bodies relative to solar system, galaxy, and universe, including distance, size, and composition.
SC.8.E.5.4:	Explore the Law of Universal Gravitation by explaining the role that gravity plays in the formation of planets, stars, and solar systems and in determining their motions.
SC.8.E.5.5:	Describe and classify specific physical properties of stars: apparent magnitude (brightness), temperature (color), size, and luminosity (absolute brightness).
SC.8.E.5.6:	Create models of solar properties including: rotation, structure of the Sun, convection, sunspots, solar flares, and prominences.
SC.8.E.5.7:	Compare and contrast the properties of objects in the Solar System including the Sun, planets, and moons to those of Earth, such as gravitational force, distance from the Sun, speed, movement, temperature, and atmospheric conditions.
SC.8.E.5.8:	Compare various historical models of the Solar System, including geocentric and heliocentric.
	Explain the impact of objects in space on each other including:
SC.8.E.5.9:	1. the Sun on the Earth including seasons and gravitational attraction
	2. the Moon on the Earth, including phases, tides, and eclipses, and the relative position of each body.
SC.8.E.5.10:	Assess how technology is essential to science for such purposes as access to outer space and other remote locations, sample collection, measurement, data collection and storage, computation, and communication of information.
SC.8.E.5.11:	Identify and compare characteristics of the electromagnetic spectrum such as wavelength, frequency, use, and hazards and recognize its application to an understanding of planetary images and satellite photographs.
SC.8.E.5.12:	Summarize the effects of space exploration on the economy and culture of Florida.
SC.8.L.18.1:	Describe and investigate the process of photosynthesis, such as the roles of light, carbon dioxide, water and chlorophyll; production of food; release of oxygen.
SC.8.L.18.2:	Describe and investigate how cellular respiration breaks down food to provide energy and releases carbon dioxide.
SC.8.L.18.3:	Construct a scientific model of the carbon cycle to show how matter and energy are continuously transferred within and between organisms and their physical environment.
SC.8.L.18.4:	Cite evidence that living systems follow the Laws of Conservation of Mass and Energy.
SC.8.N.1.1:	Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.8.N.1.2:	Design and conduct a study using repeated trials and replication.
SC.8.N.1.3:	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.
SC.8.N.1.4:	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.
SC.8.N.1.6:	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
SC.8.N.2.1:	Distinguish between scientific and pseudoscientific ideas.
SC.8.N.2.2:	Discuss what characterizes science and its methods.
SC.8.N.3.1:	Select models useful in relating the results of their own investigations.
SC.8.N.3.2:	Explain why theories may be modified but are rarely discarded.
SC.8.N.4.1:	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.
SC.8.N.4.2:	Explain how political, social, and economic concerns can affect science, and vice versa.
SC.8.P.8.1:	Explore the scientific theory of atoms (also known as atomic theory) by using models to explain the motion of particles in solids, liquids, and gases.
SC.8.P.8.2:	Differentiate between weight and mass recognizing that weight is the amount of gravitational pull on an object and is distinct from, though proportional to, mass.
SC.8.P.8.3:	Explore and describe the densities of various materials through measurement of their masses and volumes.
SC.8.P.8.4:	Classify and compare substances on the basis of characteristic physical properties that can be demonstrated or measured; for example, density, thermal or electrical conductivity, solubility, magnetic properties, melting and boiling points, and know that these properties are independent of the amount of the sample.
SC.8.P.8.5:	Recognize that there are a finite number of elements and that their atoms combine in a multitude of ways to produce compounds that make up all of the living and nonliving things that we encounter.
SC.8.P.8.6:	Recognize that elements are grouped in the periodic table according to similarities of their properties.
SC.8.P.8.7:	Explore the scientific theory of atoms (also known as atomic theory) by recognizing that atoms are the smallest unit of an element and are composed of sub-atomic particles (electrons surrounding a nucleus containing protons and neutrons).
SC.8.P.8.8:	Identify basic examples of and compare and classify the properties of compounds, including acids, bases, and salts.
SC.8.P.8.9:	Distinguish among mixtures (including solutions) and pure substances.

SC.8.P.9.1:	Explore the Law of Conservation of Mass by demonstrating and concluding that mass is conserved when substances undergo physical and chemical changes.
SC.8.P.9.2:	Differentiate between physical changes and chemical changes.
SC.8.P.9.3:	Investigate and describe how temperature influences chemical changes.
SC.912.E.5.4:	Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.
SC.912.P.8.1:	Differentiate among the four states of matter.
SC.912.P.8.2:	Differentiate between physical and chemical properties and physical and chemical changes of matter.
SC.912.P.8.4:	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC.912.P.8.5:	Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.
SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.
30.912.7.0.11.	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks.
MA.K12.MTR.1.1:	Help and support each other when attempting a new method or approach.
	 Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways.
MA.K12.MTR.2.1:	 Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1: MA.K12.MTR.4.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications:
	 Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence.
	 Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.

	Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
	Focus on relevant details within a problem
	Create plans and procedures to logically order events, steps or ideas to solve problems
	Decompose a complex problem into manageable parts
	Relate previously learned concepts to new concepts.
	Look for similarities among problems.
MA.K12.MTR.5.1:	Connect solutions of problems to more complicated large-scale situations.
	Clarifications:
	Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:
	Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
	Support students to develop generalizations based on the similarities found among problems.
	 Provide opportunities for students to create plans and procedures to solve problems.
	Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions.
	Mathematicians who assess the reasonableness of solutions:
	Estimate to discover possible solutions.
	Use benchmark quantities to determine if a solution makes sense.
	Check calculations when solving problems.
	Verify possible solutions by explaining the methods used.
MA.K12.MTR.6.1:	Evaluate results based on the given context.
	Clarifications:
	Have students estimate or predict solutions prior to solving
	 Prompt students to continually ask. "Does this solution make sense? How do you know?"
	Reinforce that students check their work as they progress within and after a task.
	• Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts.
	Mathematicians who apply mathematics to real-world contexts:
	Connect mathematical concepts to everyday experiences.
	 Use models and methods to understand, represent and solve problems.
	• Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or
	efficiency.
MA.K12.MTR.7.1:	Clarifications:
	Teachers who encourage students to apply mathematics to real-world contexts:
	Provide opportunities for students to create models, both concrete and abstract, and perform investigations.
	Challenge students to question the accuracy of their models and methods.
	Support students as they validate conclusions by comparing them to the given situation.
	 Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	Clarifications:
	K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without particle text. During 1st grade, students learn how to incorporate the evidence in their writing.
	2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In
	3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly
	quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide
	referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	0.12 Students continue with providus skills and should be guard of quisting style quides and the ways in which they differ
	Y-12 students continue with previous skills and should be aware or existing style guides and the ways in which they driver.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications:
	See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension.
	Clarifications:
	Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the
	girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and
	beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
	Clarifications:
	In kindergarten, students learn to listen to one another respectfully.
ELA.K12.EE.4.1:	in grades 1-2, sudents build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations
	In grades 5-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.

	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- · Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Additional content that may be included in the Grade 8 NAEP Science assessment includes:

- Rocks and rock formations bear evidence of the minerals, materials, temperature/pressure conditions, and forces that created them. (SC.4.E.6.1 and SC.4.E.6.2)
- Earth as a whole has a magnetic field that is detectable at the surface with a compass, with north and south poles and lines of force. (SC.912.P.10.16)
- The Sun is the major source of energy for phenomena on Earth's surface. (SC.3.L.17.2; SC.3.E.5.2; SC.3.E.6.1; SC.4.P.10.4; SC.4.L.17.2)
- Water, which covers the majority of Earth's surface, circulates through the crust, oceans, and atmosphere in what is known as the water cycle. (SC.5.E.7.1; SC.5.E.7.2; SC.5.E.7.6)
- A tiny fraction of the light energy from the Sun is Earth's primary source of energy, heating Earth surfaces and providing the energy that results in wind, ocean currents, and storms.(SC.2.E.7.2; SC.3.E.6.1)
- Following fertilization, cell division produces a small cluster of cells that then differentiate by appearance and function to form the basic tissues of an embryo. (SC.912.L.16.13)
- Characteristics of organisms are influenced by heredity and environment. (SC.4.L.16.2 and SC.4.L.16.3)
- Nuclear reactions take place in the Sun. (SC.912.P.10.10; SC.912.P.10.11)

The NAEP frameworks for Science may be accessed at http://www.nagb.org/publications/frameworks/science-09.pdf.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGl/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Course Number: 2002110

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: M/J COMP SCI 3 ADV Course Length: Year (Y) Course Attributes: • Class Size Core Required Course Level: 3

Course Status: State Board Approved Grade Level(s): 6,7,8

Educator Certifications

Science (Secondary Grades 7-12) Middle Grades Integrated Curriculum (Middle Grades 5-9) Physics (Grades 6-12) Earth/Space Science (Grades 6-12) Middle Grades General Science (Middle Grades 5-9) Chemistry (Grades 6-12) Biology (Grades 6-12)

M/J Science 3 Cambridge Lower Secondary (#2002115) 2014 - 2022 (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-secondary-1/cambridge-secondary-1/curriculum/

GENERAL INFORMATION

Course Number: 2002115

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: M/J SCI 3 CLS Course Length: Year (Y) **Course Attributes:** Advanced International Certificate of Education (AICE) Course Level: 3

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 6,7,8

Biology (Grades 6-12)
Earth/Space Science (Grades 6-12)
Middle Grades General Science (Middle Grades 5-9)
Chemistry (Grades 6-12)
Physics (Grades 6-12)
Science (Secondary Grades 7-12)

M/J Science 3 Cambridge Lower Secondary (#2002115) 2022 - And Beyond

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-secondary-1/cambridge-secondary-1/curriculum/.

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education

Courses > Subject: Science > SubSubject: General

• Advanced International Certificate of Education

Abbreviated Title: M/J SCI 3 CLS Course Length: Year (Y) Course Attributes:

Sciences >

(AICE)

Course Level: 3

GENERAL INFORMATION

Course Number: 2002115

Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): 6,7,8

iology (Grades 6-12)	
Earth/Space Science (Grades 6-12)	
Viddle Grades General Science (Middle Grades 5-9)	
Chemistry (Grades 6-12)	
Physics (Grades 6-12)	
cience (Secondary Grades 7-12)	

M/J International Baccalaureate MYP Comprehensive Science 3 (#2002120) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

Course Number: 2002120

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: M/J IB MYP COMP SCI3 Course Length: Year (Y) Course Attributes: • International Baccalaureate (IB) Course Level: 3

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 6,7,8

Educator Certifications

Science (Elementary Grades 1-6) Science (Secondary Grades 7-12) Middle Grades Integrated Curriculum (Middle Grades 5-9) Chemistry (Grades 6-12) Biology (Grades 6-12) Middle Grades General Science (Middle Grades 5-9) Physics (Grades 6-12) Earth/Space Science (Grades 6-12)

M/J STEM Environmental Science (#2002200) 2015 - 2022 (current)

Name	Description
SC.6.E.7.1:	Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through Earth's system.
SC.6.E.7.2:	Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate.
SC.6.E.7.3:	Describe how global patterns such as the jet stream and ocean currents influence local weather in measurable terms such as temperature, air pressure, wind direction and speed, and humidity and precipitation.
SC.6.E.7.4:	Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere.
SC.6.E.7.5:	Explain how energy provided by the sun influences global patterns of atmospheric movement and the temperature differences between air, water, and land.
SC.6.E.7.6:	Differentiate between weather and climate.
SC.6.E.7.7:	Investigate how natural disasters have affected human life in Florida.
SC.6.E.7.8:	Describe ways human beings protect themselves from hazardous weather and sun exposure.
SC.6.E.7.9:	Describe how the composition and structure of the atmosphere protects life and insulates the planet.
SC.6.N.1.2:	Explain why scientific investigations should be replicable.
SC.6.N.1.3:	Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.
SC.6.N.1.4:	Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.
SC.6.N.1.5:	Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.
SC.6.N.2.1:	Distinguish science from other activities involving thought.
SC.6.N.2.2:	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.
SC.6.N.2.3:	Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals.
SC.6.N.3.1:	Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.
SC.6.N.3.2:	Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.
SC.6.N.3.3:	Give several examples of scientific laws.
SC.6.N.3.4:	Identify the role of models in the context of the sixth grade science benchmarks.
SC.7.E.6.6:	Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.
SC.7.L.15.3:	Explore the scientific theory of evolution by relating how the inability of a species to adapt within a changing environment may contribute to the extinction of that species.
SC.7.L.17.1:	Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.
SC.7.L.17.2:	Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism.
SC.7.L.17.3:	Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.
SC.7.N.1.2:	Differentiate replication (by others) from repetition (multiple trials).
SC.7.N.1.3:	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.
SC.7.N.1.4:	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.
SC.7.N.1.5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.
SC.7.N.1.6:	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.
SC.7.N.1.7:	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.
SC.7.N.2.1:	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.
SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.
SC.7.N.3.2:	Identify the benefits and limitations of the use of scientific models.
SC.8.N.1.2:	Design and conduct a study using repeated trials and replication.
SC.8.N.1.3:	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.
SC.8.N.1.4:	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.
SC.8.N.1.6:	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
SC.8.N.2.1:	Distinguish between scientific and pseudoscientific ideas.
SC.8.N.2.2:	Discuss what characterizes science and its methods.
SC.8.N.3.1:	Select models useful in relating the results of their own investigations.
SC.8.N.3.2:	Explain why theories may be modified but are rarely discarded.
SC.8.N.4.1:	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.
SC.8.N.4.2:	Explain how political, social, and economic concerns can affect science, and vice versa.
MAFS.6.SP.1.1:	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in

 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number. Display numerical data in plots on a number line, including dot plots, histograms, and box plots. Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as
 Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number. Display numerical data in plots on a number line, including dot plots, histograms, and box plots. Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as
 Display numerical data in plots on a number line, including dot plots, histograms, and box plots. Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as
Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as
 b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as
describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.
Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.
Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line. Make sense of problems and persevere in solving them.
Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
Reason abstractly and quantitatively.
Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
Construct viable arguments and critique the reasoning of others.
Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
Model with mathematics.
Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
Use appropriate tools strategically.
Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

н

MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression x^2 + 9x + 14, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – 3(x – y) ² as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
	Analyze how environmental factors affect personal health.
HE.7.C.1.3:	Clarifications: Food refrigeration, appropriate home heating and cooling, air/water quality, and garbage/trash collection.

GENERAL NOTES

This course is an integrated Science, Technology, Engineering and Mathematics (STEM) course for middle school students. M/J STEM Environmental Science includes an integration of standards from science, mathematics, and english language arts (ELA) through the application to STEM problem solving using environmental sciences knowledge and science and engineering practices. Environmental sciences through applications such as ecosystem management, human-environmental impact, ecology and agriculture, land and resource management, and civil and environmental engineering, are emphasized in this course. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

ISTE Standards (http://www.iste.org/docs/pdfs/20-14_ISTE_Standards-S_PDF.pdf) should be incorporated in many contexts throughout the course.

Course Standards

Use grade appropriate Nature of Science and Mathematics Content benchmarks (i.e. if this course is offered to seventh grade students, then the SC.7.N benchmarks should be integrated into the course content, and SC.6.N and SC.8.N benchmarks should be omitted from the seventh grade course).

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

GENERAL INFORMATION

Course Number: 2002200

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: M/J STEM ENV SCI Course Length: Year (Y) Course Attributes:

Class Size Core Required

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 6,7,8

Educator Certifications

Middle Grades General Science (Middle Grades 5-9) Earth/Space Science (Grades 6-12) Chemistry (Grades 6-12) Middle Grades Integrated Curriculum (Middle Grades 5-9) Biology (Grades 6-12)

M/J STEM Environmental Science (#2002200) 2022 - And Beyond

Name	Description
SC.6.E.7.1:	Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through Earth's system.
SC.6.E.7.2:	Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate.
SC (F 7 2)	Describe how global patterns such as the jet stream and ocean currents influence local weather in measurable terms such as temperature, air
30.0.E.7.3.	pressure, wind direction and speed, and humidity and precipitation.
SC.6.E.7.4:	Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere.
SC.6.E.7.5:	Explain how energy provided by the sun influences global patterns of atmospheric movement and the temperature differences between air, water, and land
SC 6 F 7 6 [.]	Differentiate between weather and climate
SC 6 F 7 7	Investigate how natural disasters have affected human life in Florida
SC.6.F.7.8:	Describe ways human beings protect themselves from hazardous weather and sun exposure.
SC.6.F.7.9:	Describe how the composition and structure of the atmosphere protects life and insulates the planet.
SC.6.N.1.2:	Explain why scientific investigations should be replicable.
SC.6.N.1.3:	Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.
SC.6.N.1.4:	Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.
SC.6.N.1.5:	Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.
SC.6.N.2.1:	Distinguish science from other activities involving thought.
SC.6.N.2.2:	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.
SC.6.N.2.3:	Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests,
	diffu guals.
SC.6.N.3.1:	individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.
SC.6.N.3.2:	Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.
SC.6.N.3.3:	Give several examples of scientific laws.
SC.6.N.3.4:	Identify the role of models in the context of the sixth grade science benchmarks.
SC 7 F 4 4	Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the
SU.7.E.0.0.	flow of water.
SC.7.L.15.3:	Explore the scientific theory of evolution by relating how the inability of a species to adapt within a changing environment may contribute to the extinction of that species.
SC.7.L.17.1:	Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.
SC.7.L.17.2:	Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism.
SC.7.L.17.3:	Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and pesting sites
SC 7 N 1 2	Differentiate replication (by others) from repetition (multiple trials)
	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and
SC.7.N.1.3:	explain that not all scientific knowledge is derived from experimentation.
SC.7.N.1.4:	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.
SC.7.N.1.5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.
SC.7.N.1.6:	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.
SC.7.N.1.7:	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.
SC.7.N.2.1:	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.
SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports
SC 7 N 3 2	unon.
SC 8 N 1 2	Decign and conduct a study using repeated trials and replication
SC.8.N.1.3:	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge
	ciaim.
SC.8.N.1.4:	Explain now hypotheses are valuable in they lead to further investigations, even in they turn out not to be supported by the data.
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.
SC.8.N.1.6:	imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
SC.8.N.2.1:	Distinguish between scientific and pseudoscientific ideas.
SC.8.N.2.2:	Discuss what characterizes science and its methods.
SC.8.N.3.1:	Select models useful in relating the results of their own investigations.
SC.8.N.3.2:	Explain why theories may be modified but are rarely discarded.
SC.8.N.4.1:	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.
SC.8.N.4.2:	Explain how political, social, and economic concerns can affect science, and vice versa.
	Mathematicians who participate in effortful learning both individually and with others:
	 Analyze the problem in a way that makes sense given the task.

	 Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks.
MA.K12.MTR.1.1:	 Help and support each other when attempting a new method or approach. Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	 Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions:
-------------------	---
	 Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
	Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
	 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science. Analyze how environmental factors affect personal health.
HE.7.C.1.3:	Clarifications: Food refrigeration, appropriate home heating and cooling, air/water quality, and garbage/trash collection.

GENERAL NOTES

This course is an integrated Science, Technology, Engineering and Mathematics (STEM) course for middle school students. M/J STEM Environmental Science includes an integration of standards from science, mathematics, and english language arts (ELA) through the application to STEM problem solving using environmental sciences knowledge and science and engineering practices. Environmental sciences through applications such as ecosystem management, human-environmental impact, ecology and agriculture, land and resource management, and civil and environmental engineering, are emphasized in this course. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

ISTE Standards (http://www.iste.org/docs/pdfs/20-14_ISTE_Standards-S_PDF.pdf) should be incorporated in many contexts throughout the course.

Course Standards

Use grade appropriate Nature of Science and mathematics content benchmarks (i.e. if this course is offered to seventh grade students, then the SC.7.N benchmarks should be integrated into the course content, and SC.6.N and SC.8.N benchmarks should be omitted from the seventh grade course).

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

GENERAL INFORMATION

Course Number: 2002200

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: M/J STEM ENV SCI Course Length: Year (Y) Course Attributes: • Class Size Core Required

Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): 6,7,8

Educator Certifications

Middle Grades General Science (Middle Grades 5-9) Earth/Space Science (Grades 6-12) Chemistry (Grades 6-12) Middle Grades Integrated Curriculum (Middle Grades 5-9) Dialogy (Grades 6-12)

Biology (Grades 6-12)

M/J Physical Science (#2003010) 2015 - 2022 (current)

Course Standards

Use grade appropriate Nature of Science benchmarks (i.e. if this course is offered to seventh grade students, then the SC.7.N benchmarks should be integrated into the course content, and SC.6.N and SC.8.N benchmarks should be omitted from the seventh grade course).

Namo	Description
Name	Description
SC 6 N 1 1	being a problem norm the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out
30.0.N.T.T.	in charts tables and graphics analyze information make predictions and defend conclusions
SC 6 N 1 2	Explain why scientific investigations should be replicable
SC 6 N 1 3	Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each
SC 6 N 1 4:	Discuss compare and negotiate methods used results obtained and explanations among groups of students conducting the same investigation
SC 6 N 1 5	Biscuss, compare, and negotiate methods used, results obtained, and explanations among groups of stadents conducting the same investigation.
SC 6 N 2 1	Distinguish science from other activities involving thought
SC 6 N 2 2	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered
36.0.11.2.2.	Percentise that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests
SC.6.N.2.3:	and noals
	Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an
SC.6.N.3.1:	individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.
60 (N 0 0	Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws
SC.6.N.3.2:	are different from societal laws.
SC.6.N.3.3:	Give several examples of scientific laws.
SC.6.N.3.4:	Identify the role of models in the context of the sixth grade science benchmarks.
CC (D 11 1.	Explore the Law of Conservation of Energy by differentiating between potential and kinetic energy. Identify situations where kinetic energy is
SC.6.P.11.1:	transformed into potential energy and vice versa.
SC.6.P.12.1:	Measure and graph distance versus time for an object moving at a constant speed. Interpret this relationship.
SC.6.P.13.1:	Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational.
SC 6 D 12 2	Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much
30.0.P.13.2.	mass the objects have and how far apart they are.
SC.6.P.13.3:	Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both.
	Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out
SC.7.N.1.1:	scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data
	in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.7.N.1.2:	Differentiate replication (by others) from repetition (multiple trials).
SC.7.N.1.3:	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and
	explain that not all scientific knowledge is derived from experimentation.
SC.7.N.1.4:	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.
SC.7.N.1.5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.
SC.7.N.1.6:	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.
SC.7.N.1.7:	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.
SC.7.N.2.1:	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are
	encountered.
SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports
SC 7 N 2 2.	ulicili.
SC.7.N.3.2:	Identity the benefits and limitations of the use of scientific models.
SC.7.P.10.1:	mustrate that the sun signal more as radiation with a wide range of wavelengths, including initiated, visible, and that white light is made up of a spectrum of many different colors
SC 7 P 10 2	Observe and explain that light can be reflected, refracted, and/or absorbed
SC.7.F.10.2.	Description and explain that right can be renected, i en acted, and/or absorbed.
SC 7 P 11 1	Recognize that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state
SC.7.F.11.1.	Investigate and describe the transformation of onergy from one form to another.
SC 7 D 11 2	Cite evidence to evidence to evidence that energy cannot be created nor destrayed, only changed from one form to another
SC 7 D 11 A	Observe and describe that heat flows in predictable ways, maying from warmer objects to seeler ones until they reach the same temperature
30.7.F.11.4.	Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding plan and corrupt to
SC 8 N 1 1	scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data
30.0.N.T.T.	in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC 8 N 1 2	Design and conduct a study using repeated trials and replication
	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge
SC.8.N.1.3:	claim.
SC.8.N.1.4:	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.
	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of
SC.8.N.1.6:	imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
SC.8.N.2.1:	Distinguish between scientific and pseudoscientific ideas.

SC.8.N.2.2:	Discuss what characterizes science and its methods.
SC.8.N.3.1:	Select models useful in relating the results of their own investigations.
SC.8.N.3.2:	Explain why theories may be modified but are rarely discarded.
SC.8.N.4.1:	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.
SC.8.N.4.2:	Explain how political, social, and economic concerns can affect science, and vice versa.
SC.8.P.8.1:	Explore the scientific theory of atoms (also known as atomic theory) by using models to explain the motion of particles in solids, liquids, and gases.
SC.8.P.8.2:	Differentiate between weight and mass recognizing that weight is the amount of gravitational pull on an object and is distinct from, though proportional to, mass.
SC.8.P.8.3:	Explore and describe the densities of various materials through measurement of their masses and volumes.
SC.8.P.8.4:	Classify and compare substances on the basis of characteristic physical properties that can be demonstrated or measured; for example, density, thermal or electrical conductivity, solubility, magnetic properties, melting and boiling points, and know that these properties are independent of the amount of the sample.
SC.8.P.8.5:	Recognize that there are a finite number of elements and that their atoms combine in a multitude of ways to produce compounds that make up all of the living and nonliving things that we encounter.
SC.8.P.8.6:	Recognize that elements are grouped in the periodic table according to similarities of their properties.
SC.8.P.8.7:	Explore the scientific theory of atoms (also known as atomic theory) by recognizing that atoms are the smallest unit of an element and are composed of sub-atomic particles (electrons surrounding a nucleus containing protons and neutrons).
SC.8.P.8.8:	Identify basic examples of and compare and classify the properties of compounds, including acids, bases, and salts.
SC.8.P.8.9:	Distinguish among mixtures (including solutions) and pure substances.
SC.8.P.9.1:	Explore the Law of Conservation of Mass by demonstrating and concluding that mass is conserved when substances undergo physical and chemical changes.
SC.8.P.9.2:	Differentiate between physical changes and chemical changes.
SC.8.P.9.3:	Investigate and describe how temperature influences chemical changes.
LAFS.68.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts.
LAFS.68.RST.1.2:	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
LAFS.68.RST.1.3:	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LAFS.68.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.
LAFS.68.RST.2.5:	Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.
LAFS.68.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
LAFS.68.RST.3.7:	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LAFS.68.RST.3.8:	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
LAFS 68 RST 3 9	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on
	the same topic.
LAFS.68.RST.4.10:	By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.
LAFS.68.WHST.1.1:	 a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports the argument presented.
LAFS.68.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples. c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to inform about or explain the topic. e. Establish and maintain a formal style and objective tone. f. Provide a concluding statement or section that follows from and supports the information or explanation presented.
LAFS.68.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.68.WHST.2.5:	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
LAFS.68.WHST.2.6:	Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.
LAFS.68.WHST.3.7:	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
LAFS.68.WHST.3.8:	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
LAFS.68.WHST.3.9:	Draw evidence from informational texts to support analysis reflection, and research.
LAFS.68.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
	 a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.

LAFS.8.SL.1.1:	b. Follow rules for collegial discussions and decision-making, track progress toward specific goals and deadlines, and define individual roles as needed.
	c. Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations and ideas.
	d. Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented.
LAFS.8.SL.1.2:	Analyze the purpose of information presented in diverse media and formats (e.g., visually, quantitatively, orally) and evaluate the motives (e.g., socia commercial, political) behind its presentation.
LAFS.8.SL.1.3:	Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and relevance and sufficiency of the evidence and identifying when irrelevant evidence is introduced.
LAFS.8.SL.2.4:	Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well- chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.
LAFS.8.SL.2.5:	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.
MAFS.6.SP.2.5:	 Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.
MAFS.7.SP.2.4:	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth grade science book are generally longer than the words in a chapter of a
MAFS.7.SP.3.5:	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
MAFS.8.F.2.5:	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
	Clarifications: Fluency Expectations or Examples of Culminating Standards
MAFS.8.G.3.9:	When students learn to solve problems involving volumes of cones, cylinders, and spheres — together with their previous grade 7 work in angle measure, area, surface area and volume (7.G.2.4–2.6) — they will have acquired a well-developed set of geometric measurement skills. These skills, along with proportional reasoning (7.RP) and multistep numerical problem solving (7.EE.2.3), can be combined and used in flexible ways as part of modeling during high school — not to mention after high school for college and careers.
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting
MAFS.K12.MP.2.1:	Reason abstractly and quantitatively. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Model with mathematics.
	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional

	use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see
WAFS.K12.WP.7.1:	9x + 14, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see
	students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression x^2 + 0x + 14 elder students are a see the 14 ss 2x 2 and the 0 ss 2 + 7. They reserving the significance of an aviiting line in a comparing forward end
	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as given and three more or they may sold as the selection of change according to how many sides the change have.
	Look for and make use of structure.
	Standard Relation to Course: Supporting
	definitions.
	efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of
MAES K12 MP 6 1	about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and
	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful
	Attend to precision.
	Standard Relation to Course: Supporting
	able to use technological tools to explore and deepen their understanding of concepts.
	identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are
	mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying
MAFS.K12.MP.5.1:	graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other
	Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze
	concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software.
	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper,
	Use appropriate tools strategically.
	Standard Relation to Course: Supporting
	results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical
MAFS.K12.MP.4.1:	are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are
	or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know
	reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.

- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGl/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Cour

	Course Path: Section: Grades PreK to 12 Education
se Number: 2003010	Courses > Subject: Science > SubSubject: Physica
	Sciences >
	Abbreviated Title: M/J PHY SCI
	Course Length: Year (Y)
	Course Attributes:
	Class Size Core Required
	Course Level: 2
se Status: Course Approved	

Course Status: Course Approv Grade Level(s): 6,7,8

Educator Certifications

cience (Secondary Grades 7-12)	
Niddle Grades Integrated Curriculum (Middle Grades 5-9)	
hysics (Grades 6-12)	
liddle Grades General Science (Middle Grades 5-9)	
hemistry (Grades 6-12)	
arth/Space Science (Grades 6-12)	

M/J Physical Science (#2003010) 2022 - And Beyond

Course Standards

Use grade appropriate Nature of Science benchmarks (i.e. if this course is offered to seventh grade students, then the SC.7.N benchmarks should be integrated into the course content, and SC.6.N and SC.8.N benchmarks should be omitted from the seventh grade course).

Namo	Description
Name	Description
SC 6 N 1 1	being a problem norm the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out
30.0.N.T.T.	in charts tables and graphics analyze information make predictions and defend conclusions
SC 6 N 1 2	Explain why scientific investigations should be replicable
SC 6 N 1 3	Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each
SC 6 N 1 4	Discuss compare and pegotiate methods used results obtained and explanations among groups of students conducting the same investigation
SC 6 N 1 5	Biscuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.
SC 6 N 2 1	Distinguish science from other activities involving thought
SC 6 N 2 2	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered
36.0.11.2.2.	Percentise that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests
SC.6.N.2.3:	and goals.
	Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an
SC.6.N.3.1:	individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.
60 (N 0 0	Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws
SC.6.N.3.2:	are different from societal laws.
SC.6.N.3.3:	Give several examples of scientific laws.
SC.6.N.3.4:	Identify the role of models in the context of the sixth grade science benchmarks.
CC (D 11 1.	Explore the Law of Conservation of Energy by differentiating between potential and kinetic energy. Identify situations where kinetic energy is
SC.6.P.11.1:	transformed into potential energy and vice versa.
SC.6.P.12.1:	Measure and graph distance versus time for an object moving at a constant speed. Interpret this relationship.
SC.6.P.13.1:	Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational.
CC (D 12 2.	Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much
30.0.P.13.2.	mass the objects have and how far apart they are.
SC.6.P.13.3:	Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both.
	Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out
SC.7.N.1.1:	scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data
	in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.7.N.1.2:	Differentiate replication (by others) from repetition (multiple trials).
SC.7.N.1.3:	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and
	explain that not all scientific knowledge is derived from experimentation.
SC.7.N.1.4:	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.
SC.7.N.1.5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.
SC.7.N.1.6:	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.
SC.7.N.1.7:	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.
SC.7.N.2.1:	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are
	encountered.
SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports
SC 7 N 2 2.	ulicili.
SC.7.N.3.2:	Identity the benefits and limitations of the use of scientific models.
SC.7.P.10.1:	mustrate that the sun signed as realized on with a wide range of wavelengths, including initiated, visible, and unitaviolet, and that white light is made up of a spectrum of many different colors
SC 7 P 10 2	Observe and explain that light can be reflected, refracted, and/or absorbed
SC.7.F.10.2.	Description and explain that right can be renected, i en acted, and/or absorbed.
SC 7 P 11 1	Recognize that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state
SC.7.F.11.1.	Investigate and describe the transformation of onergy from one form to another.
SC 7 D 11 2	Cite evidence to evidence to evidence that energy cannot be created nor destrayed, only changed from one form to another
SC 7 D 11 A	Observe and describe that heat flows in predictable ways, maying from warmer objects to seeler ones until they reach the same temperature
30.7.F.11.4.	Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding plan and corrupt to
SC 8 N 1 1	scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data
30.0.N.T.T.	in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.8.N.1.2:	Design and conduct a study using repeated trials and replication.
	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge
SC.8.N.1.3:	claim.
SC.8.N.1.4:	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.
	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of
SC.8.N.1.6:	imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
SC.8.N.2.1:	Distinguish between scientific and pseudoscientific ideas.

SC.8.N.2.2:	Discuss what characterizes science and its methods.
SC.8.N.3.1:	Select models useful in relating the results of their own investigations.
SC.8.N.3.2:	Explain why theories may be modified but are rarely discarded.
SC.8.N.4.1:	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.
SC.8.N.4.2:	Explain how political, social, and economic concerns can affect science, and vice versa.
SC.8.P.8.1:	Explore the scientific theory of atoms (also known as atomic theory) by using models to explain the motion of particles in solids, inquids, and gases.
SC.8.P.8.2:	proportional to, mass.
SC.8.P.8.3:	Explore and describe the densities of various materials through measurement of their masses and volumes.
SC.8.P.8.4:	Classify and compare substances on the basis of characteristic physical properties that can be demonstrated or measured; for example, density, thermal or electrical conductivity, solubility, magnetic properties, melting and boiling points, and know that these properties are independent of the amount of the sample.
SC.8.P.8.5:	Recognize that there are a finite number of elements and that their atoms combine in a multitude of ways to produce compounds that make up all of the living and nonliving things that we encounter.
SC.8.P.8.6:	Recognize that elements are grouped in the periodic table according to similarities of their properties.
SC.8.P.8.7:	Explore the scientific theory of atoms (also known as atomic theory) by recognizing that atoms are the smallest unit of an element and are composed of sub-atomic particles (electrons surrounding a nucleus containing protons and neutrons).
SC.8.P.8.8:	Identify basic examples of and compare and classify the properties of compounds, including acids, bases, and salts.
SC.8.P.8.9:	Distinguish among mixtures (including solutions) and pure substances.
SC.8.P.9.1:	Explore the Law of Conservation of Mass by demonstrating and concluding that mass is conserved when substances undergo physical and chemical changes.
SC.8.P.9.2:	Differentiate between physical changes and chemical changes.
SC.8.P.9.3:	Investigate and describe how temperature influences chemical changes.
	Mathematicians who participate in effortful learning both individually and with others:
	 Analyze the problem in a way that makes sense given the task.
	Ask questions that will help with solving the task.
	 Build perseverance by modifying methods as needed while solving a challenging task.
	 Stay engaged and maintain a positive mindset when working to solve tasks.
MA K12 MTR 1 1-	 Help and support each other when attempting a new method or approach.
W// CIXT2.WITK.T.T.	Clarifications:
	Teachers who encourage students to participate actively in effortful learning both individually and with others:
	Cultivate a community of growth mindset learners.
	Foster perseverance in students by choosing tasks that are challenging.
	Develop students' ability to analyze and problem solve.
	• Recognize students effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:
	Build understanding through modeling and using manipulatives.
	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
	 Progress from modeling problems with objects and drawings to using algorithms and equations.
	Express connections between concepts and representations.
MA.K12.MTR.2.1:	Choose a representation based on the given context or purpose.
	Clarifications
	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:
	Help students make connections between concepts and representations.
	Provide opportunities for students to use manipulatives when investigating concepts.
	Guide students from concrete to pictorial to abstract representations as understanding progresses.
	Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency.
	Select efficient and appropriate methods for solving problems within the given context.
	Maintain flexibility and accuracy while performing procedures and mental calculations.
	Complete tasks accurately and with confidence.
MA.K12.MTR.3.1:	Adapt procedures to apply them to a new context. Ise feedback to improve efficiency when performing calculations
	• Use recuback to improve enciency when performing calculations.
	Clarifications:
	Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately
	Offer multiple opportunities for students to practice efficient and generalizable methods.
	Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
	Communicate mathematical ideas, vocabulary and matheds officially and mathematical ideas.
	Analyze the mathematical thinking of others
	Compare the efficiency of a method to those expressed by others
	Recognize errors and suggest how to correctly solve the task.
	Justify results by explaining methods and processes.
MA.K12.MTR.4.1:	Construct possible arguments based on evidence.

	 Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.
	Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
MA.K12.MTR.5.1:	 Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations.
	 Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
	Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
MA.K 12.WTK.7.1:	 Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
MA.K12.MTR.7.1: ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1:	 Prompt students to continuely ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts. Mathematics to real-world contexts. Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. * Redesign models and methods to improve accuracy or efficiency. Clarifications: Clarifications: Charifications: Charifications: Charifications: Charifications: Charificate students to explain to accuracy of their models and methods. Subuents to gather students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines. Citerifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their writing, students will and reference comments made by speakers and peers. Students cite texts that theyve directly queted, paraphraed, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide to create a proper citation. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that theyve directly queted, paraphra

	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing.
	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- · Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- · Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Course Number: 2003010

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: Physical Sciences > Abbreviated Title: M/J PHY SCI Course Length: Year (Y) Course Attributes: • Class Size Core Required Course Level: 2

Course Status: State Board Approved Grade Level(s): 6,7,8

Educator Certifications

Science (Secondary Grades 7-12) Middle Grades Integrated Curriculum (Middle Grades 5-9) Physics (Grades 6-12) Middle Grades General Science (Middle Grades 5-9) Chemistry (Grades 6-12) Earth/Space Science (Grades 6-12)

M/J Physical Science, Advanced (#2003020) 2015 - 2022 (current)

Course Standards

Use grade appropriate Nature of Science benchmarks (i.e. if this course is offered to seventh grade students, then the SC.7.N benchmarks should be integrated into the course content, and SC.6.N and SC.8.N benchmarks should be omitted from the seventh grade course).

Name	Description
SC.6.P.11.1:	Explore the Law of Conservation of Energy by differentiating between potential and kinetic energy. Identify situations where kinetic energy is transformed into potential energy and vice versa.
SC.6.P.12.1:	Measure and graph distance versus time for an object moving at a constant speed. Interpret this relationship.
SC.6.P.13.1:	Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational.
SC.6.P.13.2:	Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much mass the objects have and how far apart they are.
SC.6.P.13.3:	Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both.
SC.7.N.1.1:	Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.7.N.1.2:	Differentiate replication (by others) from repetition (multiple trials).
SC.7.N.1.3:	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.
SC.7.N.1.4:	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.
SC.7.N.1.5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.
SC.7.N.1.6:	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.
SC.7.N.1.7:	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.
SC.7.N.2.1:	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.
SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.
SC.7.N.3.2:	Identify the benefits and limitations of the use of scientific models.
SC.7.P.10.1:	Illustrate that the sun's energy arrives as radiation with a wide range of wavelengths, including infrared, visible, and ultraviolet, and that white light is made up of a spectrum of many different colors.
SC.7.P.10.2:	Observe and explain that light can be reflected, refracted, and/or absorbed.
SC.7.P.10.3:	Recognize that light waves, sound waves, and other waves move at different speeds in different materials.
SC.7.P.11.1:	Recognize that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state.
SC.7.P.11.2:	Investigate and describe the transformation of energy from one form to another.
SC.7.P.11.3:	Cite evidence to explain that energy cannot be created nor destroyed, only changed from one form to another.
SC.7.P.11.4:	Observe and describe that heat flows in predictable ways, moving from warmer objects to cooler ones until they reach the same temperature.
SC.8.N.1.1:	Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.8.N.1.2:	Design and conduct a study using repeated trials and replication.
SC.8.N.1.3:	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.
SC.8.N.1.4:	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.
SC.8.N.1.6:	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
SC.8.N.2.1:	Distinguish between scientific and pseudoscientific ideas.
SC.8.N.2.2:	Discuss what characterizes science and its methods.
SC.8.N.3.1:	Select models useful in relating the results of their own investigations.
SC.8.N.3.2:	Explain why theories may be modified but are rarely discarded.
SC.8.N.4.1:	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.
SC.8.N.4.2:	Explain how political, social, and economic concerns can affect science, and vice versa.
SC.8.P.8.1:	Explore the scientific theory of atoms (also known as atomic theory) by using models to explain the motion of particles in solids, liquids, and gases.
SC.8.P.8.2:	Differentiate between weight and mass recognizing that weight is the amount of gravitational pull on an object and is distinct from, though proportional to, mass.
SC.8.P.8.3:	Explore and describe the densities of various materials through measurement of their masses and volumes.
SC.8.P.8.4:	Classify and compare substances on the basis of characteristic physical properties that can be demonstrated or measured; for example, density, thermal or electrical conductivity, solubility, magnetic properties, melting and boiling points, and know that these properties are independent of the amount of the sample.
SC.8.P.8.5:	Recognize that there are a finite number of elements and that their atoms combine in a multitude of ways to produce compounds that make up all of the living and nonliving things that we encounter.
SC.8.P.8.6:	Recognize that elements are grouped in the periodic table according to similarities of their properties.
SC.8.P.8.7:	Explore the scientific theory of atoms (also known as atomic theory) by recognizing that atoms are the smallest unit of an element and are composed of sub-atomic particles (electrons surrounding a nucleus containing protons and neutrons).

SC.8.P.8.8:	Identify basic examples of and compare and classify the properties of compounds, including acids, bases, and salts.	
SC.8.P.8.9:	Distinguish among mixtures (including solutions) and pure substances.	
SC.8.P.9.1:	Explore the Law of Conservation of Mass by demonstrating and concluding that mass is conserved when substances undergo physical and chemical	
SC 8 P 9 2.	Differentiate between physical changes and chemical changes	
SC 8 P 9 3	Investigate and describe how temperature influences chemical changes	
SC.912.P.8.1:	Differentiate among the four states of matter.	
SC.912.P.8.2:	Differentiate between physical and chemical properties and physical and chemical changes of matter.	
	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons.	
SC.912.P.8.4:	and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.	
SC.912.P.8.5:	Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.	
SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.	
SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.	
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.	
SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter.	
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.	
LAFS.68.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts.	
LAFS.68.RST.1.2:	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.	
LAFS.68.RST.1.3:	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.	
LAFS.68.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.	
LAFS.68.RST.2.5:	Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.	
LAFS.68.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.	
LAFS.68.RST.3.7:	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).	
LAFS.68.RST.3.8:	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.	
LAFS.68.RST.3.9:	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.	
LAFS.68.RST.4.10:	By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.	
LAFS.68.WHST.1.1:	 a. Introduce claim(s) about a topic of issue, acknowledge and distinguish the claim(s) from alternate of opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports the argument presented. 	
LAFS.68.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples. c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to inform about or explain the topic. e. Establish and maintain a formal style and objective tone. f. Provide a concluding statement or section that follows from and supports the information or explanation presented. 	
LAFS.68.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	
LAFS.68.WHST.2.5:	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.	
LAFS.68.WHST.2.6:	Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.	
LAFS.68.WHST.3.7:	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.	
LAFS.68.WHST.3.8:	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.	
LAFS.68.WHST.3.9:	Draw evidence from informational texts to support analysis reflection, and research.	
LAFS.68.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	
LAFS.8.SL.1.1:	 discipline-specific tasks, purposes, and audiences. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. b. Follow rules for collegial discussions and decision-making, track progress toward specific goals and deadlines, and define individual roles as needed. 	
	c. Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas.d. Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented.	

LAFS.8.SL.1.2:	Analyze the purpose of information presented in diverse media and formats (e.g., visually, quantitatively, orally) and evaluate the motives (e.g., socia commercial, political) behind its presentation.
LAFS.8.SL.1.3:	Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and relevance and sufficiency of the evidence and identifying when irrelevant evidence is introduced.
LAFS.8.SL.2.4:	Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well- chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.
LAFS.8.SL.2.5:	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.
MAFS.7.SP.2.4:	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.
MAFS.7.SP.3.5:	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
MAFS.8.F.2.5:	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
	Clarifications: Fluency Expectations or Examples of Culminating Standards
MAFS.8.G.3.9:	When students learn to solve problems involving volumes of cones, cylinders, and spheres — together with their previous grade 7 work in angle measure, area, surface area and volume (7.G.2.4–2.6) — they will have acquired a well-developed set of geometric measurement skills. These skills, along with proportional reasoning (7.RP) and multistep numerical problem solving (7.EE.2.3), can be combined and used in flexible ways as part of modeling during high school — not to mention after high school for college and careers.
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting
	Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
	Construct viable arguments and critique the reasoning of others.
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose. Standard Relation to Course: Supporting
	Use appropriate tools strategically.
	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software.

MAFS.K12.MP.5.1:	might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.

- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGl/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Course Number: 2003020

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: Physical Sciences > Abbreviated Title: M/J PHY SCI ADV Course Length: Year (Y) Course Attributes: • Class Size Core Required Course Level: 3

Course Status: Course Approved Grade Level(s): 6,7,8

Educator Certifications

Science (Secondary Grades 7-12) Middle Grades Integrated Curriculum (Middle Grades 5-9) Physics (Grades 6-12) Middle Grades General Science (Middle Grades 5-9) Chemistry (Grades 6-12) Earth/Space Science (Grades 6-12)

M/J Physical Science, Advanced (#2003020) 2022 - And Beyond

Course Standards

Use grade appropriate Nature of Science benchmarks (i.e. if this course is offered to seventh grade students, then the SC.7.N benchmarks should be integrated into the course content, and SC.6.N and SC.8.N benchmarks should be omitted from the seventh grade course).

Name	Description	
SC.6.P.11.1:	Explore the Law of Conservation of Energy by differentiating between potential and kinetic energy. Identify situations where kinetic energy is transformed into potential energy and vice versa.	
SC.6.P.12.1:	Measure and graph distance versus time for an object moving at a constant speed. Interpret this relationship.	
SC.6.P.13.1:	Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational.	
SC.6.P.13.2:	Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much mass the objects have and how far apart they are.	
SC.6.P.13.3:	Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both.	
SC.7.N.1.1:	Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.	
SC.7.N.1.2:	Differentiate replication (by others) from repetition (multiple trials).	
SC.7.N.1.3:	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.	
SC.7.N.1.4:	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.	
SC.7.N.1.5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.	
SC.7.N.1.6:	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.	
SC.7.N.1.7:	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.	
SC.7.N.2.1:	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.	
SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.	
SC.7.N.3.2:	Identify the benefits and limitations of the use of scientific models.	
SC.7.P.10.1:	Illustrate that the sun's energy arrives as radiation with a wide range of wavelengths, including infrared, visible, and ultraviolet, and that white light is made up of a spectrum of many different colors.	
SC.7.P.10.2:	Observe and explain that light can be reflected, refracted, and/or absorbed.	
SC.7.P.10.3:	Recognize that light waves, sound waves, and other waves move at different speeds in different materials.	
SC.7.P.11.1:	Recognize that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state.	
SC.7.P.11.2:	Investigate and describe the transformation of energy from one form to another.	
SC.7.P.11.3:	Cite evidence to explain that energy cannot be created nor destroyed, only changed from one form to another.	
SC.7.P.11.4:	Observe and describe that heat flows in predictable ways, moving from warmer objects to cooler ones until they reach the same temperature.	
SC.8.N.1.1:	Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.	
SC.8.N.1.2:	Design and conduct a study using repeated trials and replication.	
SC.8.N.1.3:	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.	
SC.8.N.1.4:	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.	
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.	
SC.8.N.1.6:	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.	
SC.8.N.2.1:	Distinguish between scientific and pseudoscientific ideas.	
SC.8.N.2.2:	Discuss what characterizes science and its methods.	
SC.8.N.3.1:	Select models useful in relating the results of their own investigations.	
SC.8.N.3.2:	Explain why theories may be modified but are rarely discarded.	
SC.8.N.4.1:	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.	
SC.8.N.4.2:	Explain how political, social, and economic concerns can affect science, and vice versa.	
SC.8.P.8.1:	Explore the scientific theory of atoms (also known as atomic theory) by using models to explain the motion of particles in solids, liquids, and gases.	
SC.8.P.8.2:	Differentiate between weight and mass recognizing that weight is the amount of gravitational pull on an object and is distinct from, though proportional to, mass.	
SC.8.P.8.3:	Explore and describe the densities of various materials through measurement of their masses and volumes.	
SC.8.P.8.4:	Classify and compare substances on the basis of characteristic physical properties that can be demonstrated or measured; for example, density, thermal or electrical conductivity, solubility, magnetic properties, melting and boiling points, and know that these properties are independent of the amount of the sample.	
SC.8.P.8.5:	Recognize that there are a finite number of elements and that their atoms combine in a multitude of ways to produce compounds that make up all of the living and nonliving things that we encounter.	
SC.8.P.8.6:	Recognize that elements are grouped in the periodic table according to similarities of their properties.	
SC.8.P.8.7:	Explore the scientific theory of atoms (also known as atomic theory) by recognizing that atoms are the smallest unit of an element and are composed of sub-atomic particles (electrons surrounding a nucleus containing protons and neutrons).	

SC.8.P.8.8:	Identify basic examples of and compare and classify the properties of compounds, including acids, bases, and salts.		
SC.8.P.8.9:	Distinguish among mixtures (including solutions) and pure substances.		
SC.8.P.9.1:	Explore the Law of Conservation of Mass by demonstrating and concluding that mass is conserved when substances undergo physical and chemical changes.		
SC.8.P.9.2:	Differentiate between physical changes and chemical changes.		
SC.8.P.9.3:	Investigate and describe how temperature influences chemical changes.		
SC.912.P.8.1:	Differentiate among the four states of matter.		
SC.912.P.8.2:	Differentiate between physical and chemical properties and physical and chemical changes of matter.		
	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons		
SC.912.P.8.4:	and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.		
SC.912.P.8.5:	Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.		
SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.		
SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.		
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.		
	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or		
SC.912.P.10.4:	states of matter.		
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.		
	Mathematicians who participate in effortful learning both individually and with others:		
	Analyze the problem in a way that makes sense given the task.		
	Ask questions that will belo with solving the task		
	Build perseverance by modifying methods as peeded while solving a challenging task		
	Stave and and maintain a positive mindset when working to solve tasks		
	Stay engaged and maintain a positive mindset when working to solve tasks.		
MA.K12.MTR.1.1:	 Help and support each other when attempting a new method or approach. 		
	Clarifications:		
	Teachers who encourage students to participate actively in effortful learning both individually and with others:		
	Cultivate a community of growth mindset learners.		
	Foster perseverance in students by choosing tasks that are challenging.		
	Develop students' ability to analyze and problem solve.		
	Recognize students' effort when solving challenging problems.		
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:		
	• Duild understanding through modeling and using maninulations		
	Build understanding through modeling and using manipulatives.		
	Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.		
	 Progress from modeling problems with objects and drawings to using algorithms and equations. 		
	 Express connections between concepts and representations. 		
MA.K12.MTR.2.1:	Choose a representation based on the given context or purpose.		
	Clarifications:		
	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:		
	Help students make connections between concepts and representations.		
	 Provide opportunities for students to use manipulatives when investigating concepts. 		
	Guide students from concrete to pictorial to abstract representations as understanding progresses.		
	• Show students that various representations can have different purposes and can be useful in different situations.		
	Complete tasks with mathematical fluency.		
	Mathematicians who complete tasks with mathematical fluency:		
	Select efficient and appropriate methods for solving problems within the given context.		
	Maintain frexibility and accuracy while performing procedures and mental calculations.		
	Complete tasks accurately and with confidence.		
MA.K12.MTR.3.1:	Adapt procedures to apply them to a new context.		
	Use feedback to improve efficiency when performing calculations.		
	Clarifications:		
	Teachers who encourage students to complete tasks with mathematical fluency:		
	Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.		
	Offer multiple opportunities for students to practice efficient and generalizable methods.		
	• Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.		
	Engage in discussions that reflect on the mathematical thinking of self and others.		
	Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:		
	Communicate mathematical ideas: vesabulary and methods effectively		
	Continuing are manerical bleas, vocabulary and methods effectively.		
	Analyze the mathematical thinking of others. Compare the officiency of a method to these events of the others		
	Compare the efficiency of a method to those expressed by others.		
	Recognize errors and suggest how to correctly solve the task.		
MA.K12.MTR.4.1:	Justify results by explaining methods and processes.		
	Construct possible arguments based on evidence.		
	Clarifications:		
	Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:		
	• Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.		
	Create opportunities for students to discuss their thinking with peers.		
	• Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.		

	• Develop students' ability to justify methods and compare their responses to the responses of their peers.	
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:	
MA.K12.MTR.5.1:	 Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. 	
	 Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. 	
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context.	
	 Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. 	
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. 	
	Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.	
	Cite evidence to explain and justify reasoning.	
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.	
ELA.K12.EE.1.1:	 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 	
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.	
	Read and comprehend grade-level complex texts proficiently.	
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.	
ELA.K12.EE.3.1:	Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.	
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications:	
ELA.K12.EE.4.1:	In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.	

	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.	
	Use the accepted rules governing a specific format to create quality work.	
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.	
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing.	
	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.	
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.	
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.	

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGl/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Course Number: 2003020

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: Physical Sciences > Abbreviated Title: M/J PHY SCI ADV Course Length: Year (Y) Course Attributes: • Class Size Core Required Course Level: 3

Course Status: State Board Approved Grade Level(s): 6,7,8

Educator Certifications

Science (Secondary Grades 7-12) Middle Grades Integrated Curriculum (Middle Grades 5-9) Physics (Grades 6-12) Middle Grades General Science (Middle Grades 5-9) Chemistry (Grades 6-12) Earth/Space Science (Grades 6-12)

M/J STEM Physical Science (#2003030) 2015 - 2022 (current)

Course Standards

Name	Description	
SC.6.N.1.2:	Explain why scientific investigations should be replicable.	
SC.6.N.1.3:	Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.	
SC.6.N.1.4:	Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.	
SC.6.N.1.5:	Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.	
SC.6.N.2.1:	Distinguish science from other activities involving thought.	
SC.6.N.2.2:	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.	
SC 6 N 2 3	Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests,	
30.0.N.2.3.	and goals.	
SC.6.N.3.1:	Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.	
SC.6.N.3.2:	Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.	
SC.6.N.3.3:	Give several examples of scientific laws.	
SC.6.N.3.4:	Identify the role of models in the context of the sixth grade science benchmarks.	
SC.6.P.11.1:	Explore the Law of Conservation of Energy by differentiating between potential and kinetic energy. Identify situations where kinetic energy is transformed into potential energy and vice versa.	
SC.6.P.12.1:	Measure and graph distance versus time for an object moving at a constant speed. Interpret this relationship.	
SC.6.P.13.1:	Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational.	
SC.6.P.13.2:	Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much mass the objects have and how far apart they are.	
SC.6.P.13.3:	Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both.	
SC.7.N.1.2:	Differentiate replication (by others) from repetition (multiple trials).	
SC.7.N.1.3:	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.	
SC.7.N.1.4:	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.	
SC.7.N.1.5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.	
SC.7.N.1.6:	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.	
SC.7.N.1.7:	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.	
SC.7.N.2.1:	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.	
SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.	
SC.7.N.3.2:	Identify the benefits and limitations of the use of scientific models.	
SC.7.P.10.1:	Illustrate that the sun's energy arrives as radiation with a wide range of wavelengths, including infrared, visible, and ultraviolet, and that white light is made up of a spectrum of many different colors.	
SC.7.P.10.2:	Observe and explain that light can be reflected, refracted, and/or absorbed.	
SC.7.P.10.3:	Recognize that light waves, sound waves, and other waves move at different speeds in different materials.	
SC.7.P.11.1:	Recognize that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state.	
SC.7.P.11.2:	Investigate and describe the transformation of energy from one form to another.	
SC.7.P.11.3:	Cite evidence to explain that energy cannot be created nor destroyed, only changed from one form to another.	
SC.7.P.11.4:	Observe and describe that heat flows in predictable ways, moving from warmer objects to cooler ones until they reach the same temperature.	
SC.8.N.1.2:	Design and conduct a study using repeated trials and replication.	
SC.8.N.1.3:	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.	
SC.8.N.1.4:	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.	
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.	
SC.8.N.1.6:	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.	
SC.8.N.2.1:	Distinguish between scientific and pseudoscientific ideas.	
SC.8.N.2.2:	Discuss what characterizes science and its methods.	
SC.8.N.3.1:	Select models useful in relating the results of their own investigations.	
SC.8.N.3.2:	Explain why theories may be modified but are rarely discarded.	
SC.8.N.4.1:	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.	
SC.8.N.4.2:	Explain how political, social, and economic concerns can affect science, and vice versa.	
MAFS.6.SP.1.1:	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. For example, "How old am !?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.	
MAFS.6.SP.1.2:	Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.	
MAFS.6.SP.1.3:	Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.	

MAFS.6.SP.2.4:	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.		
	Summarize numerical data sets in relation to their context, such as by:		
	a. Reporting the number of observations.		
MAFS 6 SP 2 5	b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.		
NIAI 3.0.31 .2.3.	c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered		
	d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.		
	Understand that statistics can be used to gain information about a negulation by symptomic a semple of the negulation, separations about a		
MAFS.7.SP.1.1:	population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce		
	representative samples and support valid inferences.		
MAFS.8.SP.1.2:	S.8.SP.1.2: Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linea		
	Informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.		
	analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution		
	pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the		
	original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students		
WAFS.K12.WP.1.1:	might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and		
	graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on		
	using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems		
	using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.		
	Reason austractly and quantitatively.		
	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships; the ability to decontextualize—to abstract a given situation and represent it symbolically.		
MAFS.K12.MP.2.1:	and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to		
	contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative		
	reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.		
	construct viable arguments and critique the reasoning of others.		
	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing		
	situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others,		
	and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from		
MAFS.K12.MP.3.1:	which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct		
	arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even		
	though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies.		
	Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.		
	Model with mathematics.		
	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life society, and the workplace. In		
	early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional		
	reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem		
MAFS.K12.MP.4.1:	or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know		
	able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs,		
	flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical		
	results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.		
	Use appropriate tools strategically.		
	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper,		
	concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software.		
MAFS.K12.MP.5.1:	proticient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze		
	graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other		
	mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying		
	assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are		
	able to use technological tools to explore and deepen their understanding of concepts.		
	Attend to precision.		
	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their		
MAES K12 MD 6 1	own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate occurately and		
19771 J.ICT2.IVIF.U.T.	efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give		
	carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of		
	definitions.		
	Look for and make use of structure.		

MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	Look for and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.68.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
LAFS.68.RST.3.7:	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LAFS.68.RST.3.8:	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
LAFS.68.RST.3.9:	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
LAFS.68.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports the argument presented.
LAFS.68.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples. c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to inform about or explain the topic. e. Establish and maintain a formal style and objective tone. f. Provide a concluding statement or section that follows from and supports the information or explanation presented.
LAFS.68.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.68.WHST.2.5:	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
LAFS.68.WHST.2.6:	Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.
LAFS.68.WHST.3.7:	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
LAFS.68.WHST.3.8:	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
LAFS.68.WHST.3.9:	Draw evidence from informational texts to support analysis reflection, and research.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.

GENERAL NOTES

If this course is to be used in a STEM sequence in place of either the comprehensive or subject specific course sequences, teachers should refer to the test item specifications for the 8th grade SSA for information on tested standards which can be found at: https://www.fldoe.org/core/fileparse.php/5663/urlt/swsatisG8.pdf.

This course is an integrated Science, Technology, Engineering and Mathematics (STEM) course for middle school students. M/J STEM Physical Science includes an integration of standards from science, mathematics, and english/language arts (ELA) through the application to STEM problem solving using physical science knowledge and science and engineering practices. Physical sciences through applications such as aeronautics, robotics, rocketry, mechanical, electrical, and civil engineering, are emphasized in this course. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by other using tools, materials, data collection techniques, and modeals (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

ISTE Standards (http://www.iste.org/docs/pdfs20-14_ISTE_Standards-S_PDF.pdf) should be incorporated in many contexts throughout the course.

Course Standards

Use grade appropriate Nature of Science and Mathematics Content (MAFS) benchmarks (i.e., if this course is offered to seventh grade students, then the SC.7.N benchmarks should be integrated into the course content, and SC.6.N and SC.8.N benchmarks should be omitted from the seventh grade course).

Literacy Standards in Science

GENERAL INFORMATION

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The course also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

Course Number: 2003030	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: Physical
	Sciences >
	Abbreviated Title: M/J STEM PHYSIC SCI
	Course Length: Year (Y)
	Course Attributes:
	Class Size Core Required
Course Type: Core Academic Course	Course Level: 2
Course Status: Course Approved	
Grade Level(s): 6,7,8	

Educator Certifications

Middle Grades General Science (Middle Grades 5-9) Chemistry (Grades 6-12) Physics (Grades 6-12) Earth/Space Science (Grades 6-12) Middle Grades Integrated Curriculum (Middle Grades 5-9)

M/J STEM Physical Science (#2003030) 2022 - And Beyond

Course Standards

Name	Description		
SC.6.N.1.2:	Explain why scientific investigations should be replicable.		
SC.6.N.1.3:	Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.		
SC.6.N.1.4:	Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.		
SC.6.N.1.5:	Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.		
SC.6.N.2.1:	Distinguish science from other activities involving thought.		
SC.6.N.2.2:	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.		
	Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests,		
SC.6.N.2.3:	and goals.		
SC.6.N.3.1:	Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in every day life.		
SC.6.N.3.2:	Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.		
SC.6.N.3.3:	Give several examples of scientific laws.		
SC.6.N.3.4:	Identify the role of models in the context of the sixth grade science benchmarks.		
SC.6.P.11.1:	Explore the Law of Conservation of Energy by differentiating between potential and kinetic energy. Identify situations where kinetic energy is transformed into potential energy and vice versa.		
SC.6.P.12.1:	Measure and graph distance versus time for an object moving at a constant speed. Interpret this relationship.		
SC.6.P.13.1:	Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational.		
	Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much		
SC.6.P.13.2:	mass the objects have and how far apart they are.		
SC.6.P.13.3:	Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both.		
SC.7.N.1.2:	Differentiate replication (by others) from repetition (multiple trials).		
	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and		
SC.7.N.1.3:	explain that not all scientific knowledge is derived from experimentation.		
SC 7 N 1 4 [.]	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment		
SC 7 N 1 5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology deology, and physics		
SC 7 N 1 6	Evaluation that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific evaluations are based		
SC 7 N 1 7	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.		
30.7.N.T.7.	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are		
SC.7.N.2.1:	encountered.		
SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports		
66 7 N 8 9	urem.		
SC.7.N.3.2:			
SC.7.P.10.1:	illustrate that the sun's energy arrives as radiation with a wide range of wavelengths, including infrared, visible, and ultraviolet, and that white light is made up of a spectrum of many different colors.		
SC.7.P.10.2:	Observe and explain that light can be reflected, refracted, and/or absorbed.		
SC.7.P.10.3:	Recognize that light waves, sound waves, and other waves move at different speeds in different materials.		
SC.7.P.11.1:	Recognize that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state.		
SC.7.P.11.2:	Investigate and describe the transformation of energy from one form to another.		
SC.7.P.11.3:	Cite evidence to explain that energy cannot be created nor destroyed, only changed from one form to another.		
SC.7.P.11.4:	Observe and describe that heat flows in predictable ways, moving from warmer objects to cooler ones until they reach the same temperature.		
SC.8.N.1.2:	Design and conduct a study using repeated trials and replication.		
SC.8.N.1.3:	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.		
SC.8.N.1.4:	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.		
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.		
SC.8.N.1.6:	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imprint and the application of the collected evidence.		
SC.8.N.2.1:	Distinguish between scientific and pseudoscientific ideas.		
SC.8.N.2.2:	Discuss what characterizes science and its methods.		
SC 8 N 3 1	Select models useful in relating the results of their own investigations		
SC 8 N 3 2	Evolution why theories may be modified but are rarely discarded		
SC 8 N 4 1	Explain that science is one of the processes that can be used to inform decision making at the community state national and international levels		
SC 8 N 4 2	Explain that selence is one of the processes that can be used to inform decision making at the community, state, national, and international levels.		
30.0.11.4.2.	Applain now pointical, social, and economic concerns can anect science, and vice versa.		
	Analyze the problem in a way that makes sonse given the tack		
	Anaryze the problem in a way that makes sense given the task.		
	Ask questions that will neip with solving the task.		
	Build perseverance by modifying methods as needed while solving a challenging task.		
	Stay engaged and maintain a positive mindset when working to solve tasks.		
MA K12 MTP 1 1.	Help and support each other when attempting a new method or approach.		
WITAN 12.1VIIIN.1.1.	Clarifications:		

	 Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging.
	 Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:
MA.K12.MTR.2.1:	 Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose
	 Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:
MA.K12.MTR.3.1:	 Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations.
	 Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others.
MA.K12.MTR.4.1:	 Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence.
	 Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations.
	 Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used.
MA.K12.MTR.6.1:	Evaluate results based on the given context.

	 Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts. English language learners communicate information, ideas and concepts accesses if a sector to academic language to discuss texts.

GENERAL NOTES

If this course is to be used in a STEM sequence in place of either the comprehensive or subject specific course sequences, teachers should refer to the test item specifications for the 8th grade SSA for information on tested standards which can be found at: https://www.fldoe.org/core/fileparse.php/5663/urlt/swsatisG8.pdf.

This course is an integrated Science, Technology, Engineering and Mathematics (STEM) course for middle school students. M/J STEM Physical Science includes an

integration of standards from science, mathematics, and english/language arts (ELA) through the application to STEM problem solving using physical science knowledge and science and engineering practices. Physical sciences through applications such as aeronautics, robotics, rocketry, mechanical, electrical, and civil engineering, are emphasized in this course. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by other using tools, materials, data collection techniques, and modeals (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- · Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

ISTE Standards (http://www.iste.org/docs/pdfs20-14_ISTE_Standards-S_PDF.pdf) should be incorporated in many contexts throughout the course.

Course Standards

Use grade appropriate Nature of Science and mathematics content benchmarks (i.e., if this course is offered to seventh grade students, then the SC.7.N benchmarks should be integrated into the course content, and SC.6.N and SC.8.N benchmarks should be omitted from the seventh grade course).

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

GENERAL INFORMATION

Course Number: 2003030

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 6 to 8 Education Courses > Subject: Science > SubSubject: Physical Sciences > Abbreviated Title: M/J STEM PHYSIC SCI Course Length: Year (Y) Course Attributes: • Class Size Core Required Course Level: 2

Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): 6,7,8

Educator Certifications

Middle Grades General Science (Middle Grades 5-9) Chemistry (Grades 6-12) Physics (Grades 6-12)

Biology 1 (#2000310) 2015 - 2022 (current)

Course Standards

Name	Description
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
SC.912.L.14.1:	Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.
SC.912.L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).
SC.912.L.14.3:	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.
SC.912.L.14.4:	Compare and contrast structure and function of various types of microscopes.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.14.7:	Relate the structure of each of the major plant organs and tissues to physiological processes.
SC.912.L.14.26:	Identify the major parts of the brain on diagrams or models.
SC.912.L.14.36:	Describe the factors affecting blood flow through the cardiovascular system.
SC.912.L.14.52:	Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.
SC.912.L.15.4:	Describe how and why organisms are hierarchically classified and based on evolutionary relationships.
SC.912.L.15.5:	Explain the reasons for changes in how organisms are classified.
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
SC.912.L.15.8:	Describe the scientific explanations of the origin of life on Earth.
SC.912.L.15.10:	Identify basic trends in hominid evolution from early ancestors six million years ago to modern humans, including brain size, jaw size, language, and manufacture of tools.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.15.14:	Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.16.1:	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.16.3:	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.8:	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.
SC.912.L.16.9:	Explain how and why the genetic code is universal and is common to almost all organisms.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.13:	Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.
SC.912.L.16.14:	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.
SC.912.L.16.16:	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.
SC.912.L.16.17:	Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation.
SC.912.L.17.2:	Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.5:	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.
SC.912.L.18.10:	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.

SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: 1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	 Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for acquirate and experiences.
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
SC 012 N 1 1	5. Plan investigations, (Design and evaluate a scientific investigation).
30.712.11.1.1.	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (collect data of evidence in an
	set-up, calibration, technique, maintenance, and storage).
	7. Pose answers, explanations, or descriptions of events,
	8. Generate explanations that explicate or describe natural phenomena (inferences),
	9. Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical
SC 012 N 1 4	thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as
SC.912.N.2.2:	questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
LAFS.910.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
LAFS.910.RST.1.2:	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.2.5:	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LAFS.910.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.RST.3.8:	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
LAFS.910.RST.3.9:	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support of contradict previous explanations or accounts
LAFS.910.RST.4.10:	By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.
	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-
	10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
	a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence
	from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.
LAFS.910.SL.1.1:	alternate views), clear goals and deadlines, and individual roles as needed.
	c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively
	incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.
	d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their
	own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of
	tindings, reasoning, and evidence and to add interest. Write arguments focused on discipline-specific content
	a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear
	relationships among the claim(s) counterclaims reasons and evidence

LAFS.910.WHST.1.1:	 b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and imitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.910.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.910.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.910.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
LAFS.910.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.910.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.910.WHST.4.10:	discipline-specific tasks, purposes, and audiences.
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star
MAFS.K12.MP.1.1:	Make sense of problems and persevere in solving them. Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others.
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting Model with mathematics
	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional

MAFS.K12.MP.4.1:	reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose. Standard Relation to Course: Supporting
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
MAFS.K12.MP.8.1:	Look for and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting Evaluate how environment and personal health are interrelated
HE.912.C.1.3:	Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
	Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases.
HE.912.C.1.5:	Clarifications: Health prevention, detection, and treatment of: breast and testicular cancer, suicide, obesity, and industrial-related chronic disease.
	Analyze how heredity and family history can impact personal health.
HE.912.C.1.7:	Clarifications: Drug use, family obesity, heart disease, mental health, and non-communicable illness or disease.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a
growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- $\label{eq:constraint} \textbf{4. Emphasizing students supporting answers based upon evidence from the text.}$
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

Asking questions (for science) and defining problems (for engineering).

- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

	Course Path: Section: Grades Prek to 12 Education
Course Number 2000210	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2000310	Education Courses > Subject: Science > SubSubject
	Biological Sciences >
	Abbreviated Title: BIO 1
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Class Size Core Required
Course Type: Core Academic Course	Course Level: 2
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	

Educator Certifications

Graduation Requirement: Biology

Science (Secondary Grades 7-12)	
Biology (Grades 6-12)	
Middle Grades General Science (Middle Grades 5-9)	

Equivalent Courses

2000320-Biology 1 Honors	
2000430-Biology Technology	
2000322-Cambridge Pre-AICE Biology IGCSE Level	
2000800-Florida's Preinternational Baccalaureate Biology 1	

Biology 1 (#2000310) 2022 - And Beyond

Name	Description
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
SC.912.L.14.1:	Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.
SC 912 L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and
	active transport).
SC.912.L.14.3:	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.
SC.912.L.14.4:	Compare and contrast structure and function of various types of microscopes.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.14.7:	Relate the structure of each of the major plant organs and tissues to physiological processes.
SC.912.L.14.26:	Identify the major parts of the brain on diagrams or models.
SC.912.L.14.36:	Describe the factors affecting blood flow through the cardiovascular system.
SC.912.L.14.52:	Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.
SC.912.L.15.4:	Describe how and why organisms are hierarchically classified and based on evolutionary relationships.
SC.912.L.15.5:	Explain the reasons for changes in how organisms are classified.
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
SC.912.L.15.8:	Describe the scientific explanations of the origin of life on Earth.
SC 912 L 15.10;	Identify basic trends in hominid evolution from early ancestors six million years ago to modern humans, including brain size, jaw size, language, and
30.712.2.10.10.	manufacture of tools.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.15.14:	Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.16.1:	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.16.3:	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.8:	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.
SC.912.L.16.9:	Explain how and why the genetic code is universal and is common to almost all organisms.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.13:	Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.
SC.912.L.16.14:	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.
SC.912.L.16.16:	Describe the process of melosis, including independent assortment and crossing over. Explain how reduction division results in the formation of banking asserts or shores
SC.912.L.16.17:	Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic
SC 012 17 2	Valiation.
SC.9121.17.2.	Explain the general distribution of the in aquatic systems as a function of chemistry, geography, light, depth, saminty, and temperature.
30.712.L.17. 1 .	Analyze how population size is determined by hirths, deaths, immigration, emigration, and limiting factors (hiptic and abiotic) that determine carrying
SC.912.L.17.5:	capacity.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, numan activity, and the introduction or invasive, non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.
SC.912.L.18.10:	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.

SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate
	temperature, expansion upon freezing, and versatility as a solvent.
	 Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and it not, modify or develop new models).
SC.912.N.1.1:	 Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	set-up, calibration, technique, maintenance, and storage).
	8. Generate explanations that explicate or describe natural phenomena (inferences),
	9. Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.6: SC.912 N 2 1	Describe now scientific inferences are drawn from scientific observations and provide examples from the content being studied.
00.912.N.2.11	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as
SC.912.N.2.2:	questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.4:	descriptions.
	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks.
MA.K12.MTR.1.1:	Help and support each other when attempting a new method or approach.
	Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners
	 Foster perseverance in students by choosing tasks that are challenging.
	Develop students' ability to analyze and problem solve.
	Recognize students' effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:
	Build understanding through modeling and using manipulatives.
	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Despress from modeling problems with objects and drawings to using algorithms and equations.
	 Express connections between concepts and representations.
MA.K12.MTR.2.1:	Choose a representation based on the given context or purpose.
	Clarifications:
	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:
	 Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts.
	 Guide students from concrete to pictorial to abstract representations as understanding progresses.
	Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:
	Select efficient and appropriate methods for solving problems within the given context.
MA.K12.MTR.3.1:	Maintain flexibility and accuracy while performing procedures and mental calculations.
	Complete tasks accurately and with confidence.
	 Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations
	Clarifications
	Teachers who encourage students to complete tasks with mathematical fluency:
	Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
	Offer multiple opportunities for students to practice efficient and generalizable methods.
1	 Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.

1	
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
	Communicate mathematical ideas, vocabulary and methods effectively.
	 Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others.
	 Recognize errors and suggest how to correctly solve the task.
	Justify results by explaining methods and processes.
	Construct possible arguments based on evidence.
	 Charin cations: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
	Eocus on relevant details within a problem
	Create plans and procedures to logically order events, steps or ideas to solve problems.
	Decompose a complex problem into manageable parts.
	 Relate previously learned concepts to new concepts. Look for similarities among problems.
MA.K12.MTR.5.1:	 Connect solutions of problems to more complicated large-scale situations.
	Clarifications:
	Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:
	 Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems.
	 Provide opportunities for students to create plans and procedures to solve problems.
	• Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
	Estimate to discover possible solutions.
	Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems
	 Verify possible solutions by explaining the methods used.
MA.K12.MTR.6.1:	Evaluate results based on the given context.
	Clarifications:
	 Have students estimate or predict solutions prior to solving.
	Prompt students to continually ask, "Does this solution make sense? How do you know?"
	Reinforce that students check their work as they progress within and after a task. Strengthen students' shill uto varify call time through instifications
	Strengthen students ability to verify solutions through justifications.
	Mathematicians who apply mathematics to real-world contexts:
	Connect mathematical concepts to everyday experiences.
	Use models and methods to understand, represent and solve problems.
	 Perform investigations to gather data or determine if a method is appropriate. Redesign models and methods to improve accuracy or efficiency.
MA.K12.MTR.7.1:	Clarifications:
	Teachers who encourage students to apply mathematics to real-world contexts:
	 Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to guestion the acquired user their models and matheds.
	 Chailenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation.
	Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning.
	Clarifications:
	K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.
	2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In
	and grade, students should use a combination of direct and indirect citations.
	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.

ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently.
	Clarifications:
	See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
	Evaluate how environment and personal health are interrelated.
HE.912.C.1.3:	Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
HE.912.C.1.5:	Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases.
	Clarifications: Health prevention, detection, and treatment of: breast and testicular cancer, suicide, obesity, and industrial-related chronic disease.
	Analyze how heredity and family history can impact personal health.
HE.912.C.1.7:	Clarifications: Drug use, family obesity, heart disease, mental health, and non-communicable illness or disease.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.

- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGl/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

	Course Path: Section: Grades Prek to 12 Education
Course Number: 2000210	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2000310	Education Courses > Subject: Science > SubSubject
	Biological Sciences >
	Abbreviated Title: BIO 1
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Class Size Core Required
Course Type: Core Academic Course	Course Level: 2
Course Status: State Board Approved	
Grade Level(s): 9,10,11,12	

Educator Certifications

Graduation Requirement: Biology

Science (Secondary Grades 7-12)
Biology (Grades 6-12)
Middle Grades General Science (Middle Grades 5-9)

Equivalent Courses

2000320-Biology 1 Honors
2000430-Biology Technology
2000322-Cambridge Pre-AICE Biology IGCSE Level
2000800-Florida's Preinternational Baccalaureate Biology 1

Biology 1 for Credit Recovery (#2000315) 2015 - 2022 (current)

Name	Description
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
SC.912.L.14.1:	Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.
SC.912.L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).
SC.912.L.14.3:	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.
SC.912.L.14.4:	Compare and contrast structure and function of various types of microscopes.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.14.7:	Relate the structure of each of the major plant organs and tissues to physiological processes.
SC.912.L.14.26:	Identify the major parts of the brain on diagrams or models.
SC.912.L.14.36:	Describe the factors affecting blood flow through the cardiovascular system.
SC.912.L.14.52:	Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.
SC.912.L.15.4:	Describe how and why organisms are hierarchically classified and based on evolutionary relationships.
SC.912.L.15.5:	Explain the reasons for changes in how organisms are classified.
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
SC.912.L.15.8:	Describe the scientific explanations of the origin of life on Earth.
SC.912.L.15.10:	Identify basic trends in hominid evolution from early ancestors six million years ago to modern humans, including brain size, jaw size, language, and manufacture of tools.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.15.14:	Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.16.1:	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.16.3:	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.8:	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.
SC.912.L.16.9:	Explain how and why the genetic code is universal and is common to almost all organisms.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.13:	Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.
SC.912.L.16.14:	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.
SC.912.L.16.16:	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.
SC.912.L.16.17:	Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation.
SC.912.L.17.2:	Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.5:	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.
SC.912.L.18.10:	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.

SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and 11. Evaluate the merits of the explanations produced by others
	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on, critical and logical
SC.912.N.1.3:	thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
LAFS.910.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
LAFS.910.RST.1.2:	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.2.5:	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LAFS.910.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.RST.3.8:	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
LAFS.910.RST.3.9:	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support of contradict previous explanations or accounts.
LAFS.910.RST.4.10:	By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.
LAFS.910.SL.1.1:	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study: explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
	 Write arguments focused on discipline-specific content. a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.

LAFS.910.WHST.1.1:	 b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.910.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.910.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.910.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
LAFS.910.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.910.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.910.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. *
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting
MAFS.K12.MP.2.1:	Reason abstractly and quantitatively. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others.
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting
	Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional

MAFS.K12.MP.4.1:	reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose. Standard Relation to Course: Supporting
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
MAFS.K12.MP.8.1:	Look for and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
HE.912.C.1.3:	Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
HE.912.C.1.5:	Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases. Clarifications: Health prevention, detection, and treatment of: breast and testicular cancer, suicide, obesity, and industrial-related chronic disease
	Analyze how beredity and family history can impact personal health
HE.912.C.1.7:	Clarifications: Drug use, family obesity, heart disease, mental health, and non-communicable illness or disease.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Special Notes: Credit Recovery courses are credit bearing courses with specific content requirements defined by Next Generation Sunshine State Standards and/or Florida Standards. Students enrolled in a Credit Recovery course must have previously attempted the corresponding course (and/or End-of-Course assessment) since the course requirements for the Credit Recovery course are exactly the same as the previously attempted corresponding course. For example, Geometry (1206310) and Geometry for Credit Recovery (1206315) have identical content requirements. It is important to note that Credit Recovery courses are not bound by Section 1003.436(1)(a), Florida Statutes, requiring a minimum of 135 hours of bona fide instruction (120 hours in a school/district implementing block scheduling) in a designed course of study that

contains student performance standards, since the students have previously attempted successful completion of the corresponding course. Additionally, Credit Recovery courses should ONLY be used for credit recovery, grade forgiveness, or remediation for students needing to prepare for an End-of-Course assessment retake.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2000215	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2000315	Education Courses > Subject: Science > SubSubject:
	Biological Sciences >
	Abbreviated Title: BIO 1 CR
Number of Credits: One (1) credit	Course Length: Credit Recovery (R)
Course Type: Elective Course	Course Level: 2
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	

Educator Certifications

Science (Secondary Grades 7-12)	
Biology (Grades 6-12)	
Middle Grades General Science (Middle Grades 5-9)	

Biology 1 for Credit Recovery (#2000315) 2022 - And Beyond

Name	Description
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
SC.912.L.14.1:	Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.
SC.912.L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).
SC.912.L.14.3:	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.
SC.912.L.14.4:	Compare and contrast structure and function of various types of microscopes.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.14.7:	Relate the structure of each of the major plant organs and tissues to physiological processes.
SC.912.L.14.26:	Identify the major parts of the brain on diagrams or models.
SC.912.L.14.36:	Describe the factors affecting blood flow through the cardiovascular system.
SC.912.L.14.52:	Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.
SC.912.L.15.4:	Describe how and why organisms are hierarchically classified and based on evolutionary relationships.
SC.912.L.15.5:	Explain the reasons for changes in how organisms are classified.
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
SC.912.L.15.8:	Describe the scientific explanations of the origin of life on Earth.
SC.912.L.15.10:	Identify basic trends in hominid evolution from early ancestors six million years ago to modern humans, including brain size, jaw size, language, and manufacture of tools.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.15.14:	Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.16.1:	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.16.3:	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.8:	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.
SC.912.L.16.9:	Explain how and why the genetic code is universal and is common to almost all organisms.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.13:	Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.
SC.912.L.16.14:	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.
SC.912.L.16.16:	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.
SC.912.L.16.17:	Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation.
SC.912.L.17.2:	Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.5:	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.
SC.912.L.18.10:	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.

SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate
	temperature, expansion upon freezing, and versatility as a solvent. Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:
	1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between the formation of the second state of the secon
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
SC.912.N.1.1:	 b. Plan investigations, (Design and evaluate a scientific investigation). b. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	set-up, calibration, technique, maintenance, and storage).
	7. Pose answers, explanations, or descriptions of events,
	 Generate explanations that explicate or describe natural phenomena (interences), 9. Use appropriate evidence and reasoning to justify these explanations to others.
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC 012 N 1 2.	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical
30.912.10.1.3:	thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.8.	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC 012 N 2 2	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as
SC.912.N.2.2:	questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC 912 N 3 4	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported
30.712.11.3.4.	descriptions.
	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task
	 Ask questions that will help with solving the task.
	Build perseverance by modifying methods as needed while solving a challenging task.
	Stay engaged and maintain a positive mindset when working to solve tasks.
MA.K12.MTR.1.1:	Help and support each other when attempting a new method or approach.
	Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others:
	 Cultivate a community of growth mindset learners.
	Foster perseverance in students by choosing tasks that are challenging.
	Develop students' ability to analyze and problem solve.
	Recognize students errort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:
	 Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
	 Progress from modeling problems with objects and drawings to using algorithms and equations.
	Express connections between concepts and representations.
MA.K12.MTR.2.1:	Choose a representation based on the given context or purpose.
	Clarifications:
	Help students make connections between concepts and representations.
	Provide opportunities for students to use manipulatives when investigating concepts.
	Guide students from concrete to pictorial to abstract representations as understanding progresses.
	Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency.
	Mathematicians who complete tasks with mathematical fluency:
	Select efficient and appropriate methods for solving problems within the given context.
	 Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence
	Adapt procedures to apply them to a new context.
	Use feedback to improve efficiency when performing calculations.
	Clarifications:
	Teachers who encourage students to complete tasks with mathematical fluency:
	 Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple apportunities for students to practice efficient and appendicable methods.
	 One maniple opportunities for students to practice encient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.

Higgs inducation that induces the mechanism of the large of	1	L
ALCOMENTAL Comparison and set of a set o		Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
A ALT2 MTR 4. A ALT2		Communicate mathematical ideas, vocabulary and methods effectively.
ALKED MILE 1: altion for subset to subset		 Analyze the mathematical thinking of others. Compare the officiency of a method to there expressed by others.
exact 20.000 4.3 exac		 Recognize errors and suggest how to correctly solve the task.
• Construct possible arguments based on existence. • Charding possible arguments based on existence. • Charding possible arguments based on existence in the existence and their poss. • Section 2000 contains with chindren and questioned first teacher and their post, and struct is an experiationity for leasting of control and the existence and the existence and the existence of the expense. • Develop autentic ability to justify methods and compare information groups. • Develop autentic ability to justify methods and compare information arguments to the response. • Develop autentic ability to justify methods and command information arguments. • Develop autentic ability to justify methods and command information arguments. • Develop autentic ability to justify methods. • Develop autentic ability to possify and the method control and and control autentical autentical autonts. • Develop autentic ability to possify and and should be added and and control autonts and the added control. • Develop autentic ability to possify autonts and should be added and and control autonts and autonts. • Develop autonts ability to possify autonts and should be added and and control autonts and autonts and and autonts and and autonts. • Develop autonts ability to autonts. • Develop autonts ability to		Justify results by explaining methods and processes.
Charteria Contractions VA.412-MITE 51: Contractions for support during the standard and standard st	WARTZ.WITK.+.1.	Construct possible arguments based on evidence.
Up patters and shuture in help understand and connect mathematical concepts. If the patters and shuture is help understand and connect mathematical concepts. If case an relevant deals within a problem. If case an relevant and should be parts. If case and should be parts. If case an relevant and should be parts. If case and should be parts. If case and should be parts. If case an relevant and should be parts. If case an relevant and should be parts. If case and case and be parts. If case and case and case and be parts. If case and case and case and parts.		 Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
• Coasts on relevant dealing within a proceeding of experiments, slepps or ideas to solve problems. • Construction of the logicality confirments, slepps or ideas to solve problems. • Locasts of problems, complex is complex is problem. • Locasts of problems, to more complexitient is the problem. • Locasts of problems, to more complexitient is the problems. • Locasts of problems, to more complexitient is the problems. • Locasts of problems, to more complexitient is the problems. • Locasts of problems, to more complexitient is the problems. • Locasts of problems, to dealing statutes to the problems. • Locasts of problems, to more complexitient is the problems. • Locasts of problems, to dealing statutes to the problems. • Locasts of problems, to dealing statutes to the problems. • Locasts of problems, to dealing statutes to the problems. • Locasts of problems, to dealing statutes to the problems. • Locasts problems, to dealing statutes to the problems. • Locasts attemption to dealing statutes to the problems. • Locasts attemption to dealing statutes to the problems. • Locasts attemption to dealing statutes attemption the matches assess. • Locasts attemption to controls. • Locasts attemption to controls. • Locasts attemption to controls. • Locasts attemption to controls. • Locasts attemption to controls. • Locasts attemption to controls. • Locasts attemption to controls. • Locasts attemption to controls.		Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
AK12_MTR 51: Create plans and procedures to logically order newsits, else to islass to solve problems. Decompose a complex provide in the managember parts. Context solutions of problems to more complexed large-scale situations. Context solutions of problems to more complexed large-scale situations. Context solutions of problems to more complexed large-scale situations. Context solutions of problems to more complexed large-scale situations. Context solutions of problems to more complexed large-scale situations. Context solutions of problems. Seport solutions is deviced provide into managember solutions. Decomposition is deviced provide into an angember solutions. Decomposition is deviced provide into angember solutions. Decomposition is deviced provide into angember solutions. Decomposition solutions who assess the reasonablemess of solutions. Estimate to discover possitie solutions. Estimate to discover possitie solutions. Estimate to angember solutions who assess the reasonablemess of solutions. Estimate to angember solutions in the world context. Confrictions: Teachers who encourage students to a solution makes sense? Existential solutions by copleming the methods used. Existential solutions are provide solutions. Estimate to angember and solutions in the solution make sense? Existential solutions that used solutions in the solution. Existential solutions are angember and and and and and an attract. Existential solution make sense? Existential solution and acontext. Existential solutions thand and methods a		Focus on relevant details within a problem.
People products a method is a set of a set		Create plans and procedures to logically order events, steps or ideas to solve problems.
ALALIZATION: Look for similarities anong problems: Connect solutions of problems to more complicated large scale statutions: Connect solutions of problems to more complicated large scale statutions: Connect solutions of problems to the partners and structure to help understand and connet mathematical concepts: Support students recognize the partners in the word around three and connect the subtrom to another mathematical concepts: Support students to develop generalization based on the similarities found among problems. Foreign students and structures to solve problems. To evolup students and problems of solutions: States the reasonableness of solutions: Estimate to discover possible students. Estimate to take students to assoce the reasonableness of solutions: Estimate students to assoce the reasonableness of solutions: Have students scover provide to assoce the resonableness of solutions: Have students associate to assoce the assoce the asso		 Decompose a complex problem into manageable parts. Belate providuesly learned concents to new concents.
MAK12.MTR.51: Connect solutions of problems to more complicated large-scale situations. Help student scagnize the patterns and structure to help understand and connect mathematical concepts. Help students recegnize the patterns in the world arround them and connect mathematical concepts. Help students recegnize the patterns in the world arround them and connect mathematical concepts. Help students in the students to create plans and procedures to stoye problems. Devolge students allow to construct relationships between their current understanding and more sophilatated ways of thinking. Assess the reasonableness of solutions: High students in the world arround them and connect mathematical concepts. Schingt is objective constructive and the students for ways on problems. Use banchmark quantities to descrem processing of solutions: How students solutions by explaning the methods used. Use banchmark quantities to descrem processing of solutions: How students solute or prodict solutions of solutions: How students solute or prodict solutions of solutions: 		 Look for similarities among problems.
MAK12 MIR 7.1: Cherkinations: MAK12 MIR 7.1: Cherkinations: ELACLER Sectors Sector Solutions: Cherkinations: MAK12 MIR 7.1: Cherkinations: ELACLER Sectors Sector Solutions: Cherkinations: ELACLER Sectors Solutions: Cherkinations: ELACLER Sectors Solutions: Cherkinations: ELACLER Sectors Solutions: Cherkinations: ELACLER Sectors Solutions: Cherkinations: Solution: Cherkination: Solution: Cherkinatio	MA.K12.MTR.5.1:	Connect solutions of problems to more complicated large-scale situations.
Interfacts who encourage students to use patterns and structure to negr unaerstanda and concepts. Support students to develop generalizations based on the similarities found among problems. Support students to develop develop the platerns in three world around three matching. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. NAK12 MTR.6.1: Estimate to discover possible solutions. Image: the source of the source possible solutions. Estimate to discover possible solutions. Estimate to discover possible solutions. Check calculations who assess the reasonableness of solutions. Estimate to discover possible solutions by explaining the methods used. NAK12 MTR.6.1: Existing to discover possible solutions by explaining the methods used. Evaluate results assuther reasonableness of solutions. Have students solutions profile solutions profile solutions profile solutions to continually ask, "Does this solution make sense? How do you know?" Reinforce that students to continually ask, "Does this solution make sense? Steengthen students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students to continually ask, "Does this solution make sense? Steengthen students to continually ask, "Does this solution make sense? Steengthen students to continually ask, "Does this solution make sense? How do you know?" 		Clarifications:
# Support students to develop generalizations based on the similarities found among problems. Previde opportunities for students to create plans and procedures to solve problems. Assess the reasonablemess of solutions: Mathematicians who assess the reasonablemess of solutions: • Use benchmark quantifies to denomine if a solution makes sense. • Check calculations who assess the reasonablemess of solutions: • Use benchmark quantifies to denomine if a solution makes sense. • Verify possible solutions by explaining the methods used. • Exclusion to obscore gostible solutions • Interfactors: • Teachers who encourage students to assess the reasonableness of solutions: • Interfactors:		 Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
 Provide opertunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations who assess the reasonableness of solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations who assess the reasonableness of solutions. We try possible solutions by coplianing the methods used. Evaluate results based on the given context. Clarification: Tracehors who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions provide to solving. Prompt students to continually ask, "Does this solution makes sense? How do you know?" Reinforce that students check their work as they progress within and atter a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts. Connect mathematical concepts to everyday experiences. Use models and methods to inprove accuracy or efficiency. Clarification: Clarification: Clarification: Clarification: Provide operiunities for students to apply mathematics to real-world contexts. Provide students to quastion the accuracy of their models and methods to improve accuracy or efficiency. Clarification: Clarification: Clarification: Provide operiunities for students to apply mathematics to real-world contexts. Provide operiunities for students to apply mathematics to real-world contexts. Provide operiunities for students to apply mathematics to real		• Support students to develop generalizations based on the similarities found among problems.
• Develop students ability to construct reactionings between their current understanding and more significated ways of thinking. Assess the reasonableness of Solutions. Mathematicians who assess the reasonableness of solutions: • Listinate to discover possible solutions by explaining the methods used. • Verify possible solutions by explaining the methods used. • Verify basible solutions by explaining the methods used. • Verify possible solutions by explaining the methods used. • Verify basible solutions by explaining the methods used. • Prompt students and the given context. Clarifications: • Prompt students to continually ask, "Does this solution makes sense? How do you know?" • Reinforce that students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students to read-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform Investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: • Reserve who encourge students to apply mathematics to real-world contexts. • Perform Investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications:		Provide opportunities for students to create plans and procedures to solve problems.
Making Assess the reasonableness of solutions: Mailhematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations: Whom solving problems. Verify possible solutions by explaining the methods used. Estimate results based on the given context. Clarifications: Feature results asset to continuuly ask. "Does this solution make sense? How do you know?" NAK 12.MTR 7.1: Reinforce that students to continuuly ask. "Does this solution make sense? How do you know?" NAK 12.MTR 7.1: Connect mathematical concepts to everyday experimenss. Use models and methods to understand represent and solve propriets. "Redesign models and methods to improve accuracy or efficiency. Clarifications: Feadores who apply mathematics to real-world contexts: Periods opportunities for students to capply mathematics to real-world contexts: Provide opportunities for students to capply mathematics to real-world contexts: Provide opportunities for students to capply mathematics to real-world contexts: Provide opportunities for students to capply mathematics to real-wor		Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
Elimate to discover possible solutions. Use benchmark quantilies to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions the solving problems. Verify possible solutions by explaining the methods used. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Chartications: Teachers who encourage students to assess the reasonableness of solutions: Haw student solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students determine to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students determine to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students determine to solving. Prompt students to continually ask, "Does this solution structs to solving. Prompt students to continually ask, "Does this solution structs to solving. Prompt students to contexts. Markinamicians who apply mathematics to real-world contexts: Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Charling the soft to apply mathematics to real-world contexts: Provide opportunities for students to question the accuracy of their models and methods. Support students a they validate conclusions by comparing them to the given situation. Indicate how validous concepts can be applied to other disciplines. Charling thems to taile widence in their oral communication with guidance and support from aduits. The evidence can consist of details from the text when they refer to it. In Rrd grade, students should usea combination indire		Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
Use benchmark quantities to determine if a solution makes sense. Check calculations then solving problems. Verify possible solutions by explaining the methods used. Chartfications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solution make sense? How do you know?" Normpt students to continually ask. "Does this solution make sense? How do you know?" Normpt students to continually ask. "Does this solution make sense? How do you know?" Normpt students to continually ask. "Does this solution make sense? How do you know?" Normpt students to continually ask. "Does this solution make sense? How do you know?" Normpt students to real-world contexts. Apply mathematics to real-world contexts: Apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Veriffications: Teachers who encourage students to apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Veriffications: Teachers who encourage students to apply mathematics to real-world contexts: Teachers who encourage students to apply mathematics to real-world contexts:		Estimate to discover possible solutions.
Events contained in Marking Procession Verify possible solutions by explaining the methods used. Verify possible solutions by explaining the methods used. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics for eal-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Verify possible solutions to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Frovide apportunities for students to apply mathematics to real-world contexts: • Content mathematical concepts to apply mathematics to real-world contexts: • Content mathematical concepts to apply mathematics to real-world contexts: • Provide apportunities for students to apply mathematics to real-world contexts: • Provide apportunities for students to apply mathematics to real-world contexts: • Provide apportunities for students to apply mathematics to real-world contexts: • Challenge students in question the accuracy of their models and methods. • Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During tay reads, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant evidance in their oral communication. Students include relevant evidance in their oral communication. St		 Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems
MA.K12.MTR.6.1: Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: 		 Verify possible solutions by explaining the methods used.
ELARIZEE.1.1: Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students deak their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: . Connect mathematical concepts to everyday experiences. . Use models and methods to understand, represent and solve problems. . Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: . Provide opportunities for students to question the accuracy of their models and methods. . Support students as they validate conclusions by comparing them to the given situation. . Indicate how various concepts can be applied to other disciplines. Cite evidence to explain and justfy reasoning. Cite evidence to explain and justfy reasoning. Clarifications: 2.3 Students includue textual evidence in their oral communica	MA.K12.MTR.6.1:	Evaluate results based on the given context.
Ieachers who encourage students to assess the reasonableness of solutions: I Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts. Mathematics to real-world contexts. Wathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: • Challenge students to question the accuracy of their models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines. Cite evidence to explain and justify reasoning. Clarifications: • A Students include feivant textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without nami		Clarifications:
e Prompt students to continually ask, "Does this solution make sense? How do you know?" e. Reinforce that students check their work as they progress within and after a task. e Strengthen students check their work as they progress within and after a task. e Strengthen students ability to verify solutions through justifications. Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: e Connect mathematical concepts to everyday experiences. use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. MALK12.MTR.7.1: Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: . Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students is to apply in the matcuracy of their models and methods. . Support students include return the accuracy of their models and methods. Support students include return teaching the tast. During 1st grade, students learn how to incorporate the evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2.3 Students include retevant textual evidence in their written and crad communication. Students should name the text when they refer to it. In 3rd grade, students should use a co		 Have students estimate or predict solutions prior to solving.
 Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. MA.K12.MTR.7.1: Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines. Cite evidence to explain and justify reasoning. Clarifications:		Prompt students to continually ask, "Does this solution make sense? How do you know?"
ELA_K12_EE.1.1: Apply mathematics and yet of entry solutions of under justifications. Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate Redesign models and methods to improve accuracy or efficiency. MA-K12_MTR.7.1: Clarifications: Provide opportunities for students to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines. Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During ist grade, students level and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. A-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referen		 Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify colutions through instifications.
Mathematicians who apply mathematics to real-world contexts: Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their writing and oracle and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students che text stat they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.		Strengthen students ability to verify solutions through justifications.
 Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. MA.K12.MTR.7.1: MA.K12.MTR.7.1: Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text withhout naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 23 Students include relevant textual evidence in their oral communication with guidance and support from adults. The evidence and consist of details from the text withhout naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 24 Students continue with previous skills and reference comments made by speakers and peers. Students thet we directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.		Mathematicians who apply mathematics to real-world contexts:
Here in the second s		Connect mathematical concepts to everyday experiences.
MA.K12.MTR.7.1: Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. MA.K12.MTR.7.1: Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines. Clarifications: Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students con		Use models and methods to understand, represent and solve problems.
MA.K12.MTR.7.1: Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines. Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.		 Perform investigations to gather data or determine if a method is appropriate. Redesign models and methods to improve accuracy or efficiency
Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines. Cite evidence to explain and justify reasoning. K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. ELA.K12.EE.1.1: 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide reference by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and use a style guide to create a proper citation.	MA.K12.MTR.7.1:	Clarifications:
 Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines. Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. ELA.K12.EE.1.1: 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and use a style guide to create a proper citation.		Teachers who encourage students to apply mathematics to real-world contexts:
ELA.K12.EE.1.1: ELA.K12.EE.1.1: ELA.K12.EE.1.1: ELA.K12.EE.1.1: For the students and use a style guide to communication. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. e-8 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. P12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. 		 Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to guession the accuracy of their models and methods.
Indicate how various concepts can be applied to other disciplines. Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.		 Support students as they validate conclusions by comparing them to the given situation.
ELA.K12.EE.1.1: Cite evidence to explain and justify reasoning. ELA.K12.EE.1.1: Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.		Indicate how various concepts can be applied to other disciplines.
Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. ELA.K12.EE.1.1: 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.	ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning.
 ELA.K12.EE.1.1: ELA.K12.EE.1.1: Find the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. 		Clarifications:
 ELA.K12.EE.1.1: ELA.K12.EE.1.1: ard grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. 		from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.
 ELA.K12.EE.1.1: ELA.K12.EE.1.1: 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. 		2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In
 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. 		A E Students should use a combination or direct and indirect citations.
6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.		4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.		6-8 Students continue with previous skills and use a style guide to create a proper citation.
		9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.

ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently.
	Clarifications:
	See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension.
	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
	Evaluate how environment and personal health are interrelated.
HE.912.C.1.3:	Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
	Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases.
HE.912.C.1.5:	Clarifications: Health prevention, detection, and treatment of: breast and testicular cancer, suicide, obesity, and industrial-related chronic disease.
HE.912.C.1.7:	Analyze how heredity and family history can impact personal health.
	Clarifications: Drug use, family obesity, heart disease, mental health, and non-communicable illness or disease.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Special Notes: Credit Recovery courses are credit bearing courses with specific content requirements defined by Next Generation Sunshine State Standards and/or Florida Standards. Students enrolled in a Credit Recovery course must have previously attempted the corresponding course (and/or End-of-Course assessment) since the course requirements for the Credit Recovery course are exactly the same as the previously attempted corresponding course. For example, Geometry (1206310) and Geometry for Credit Recovery (1206315) have identical content requirements. It is important to note that Credit Recovery courses are not bound by Section 1003.436(1)(a), Florida Statutes, requiring a minimum of 135 hours of bona fide instruction (120 hours in a school/district implementing block scheduling) in a designed course of study that contains student performance standards, since the students have previously attempted successful completion of the corresponding course. Additionally, Credit Recovery courses should ONLY be used for credit recovery, grade forgiveness, or remediation for students needing to prepare for an End-of-Course assessment retake.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.

- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Number of Credits: One (1) credit Course Type: Elective Course Course Status: State Board Approved Grade Level(s): 9,10,11,12 Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Biological Sciences > Abbreviated Title: BIO 1 CR Course Length: Credit Recovery (R) Course Level: 2

Educator Certifications

Science (Secondary Grades 7-12) Biology (Grades 6-12) Middle Grades General Science (Middle Grades 5-9)

Biology 1 Honors (#2000320) 2015 - 2022 (current)

Name	Description
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
SC.912.L.14.1:	Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.
SC.912.L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).
SC.912.L.14.3:	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.
SC.912.L.14.4:	Compare and contrast structure and function of various types of microscopes.
SC.912.L.14.5:	Explain the evidence supporting the scientific theory of the origin of eukaryotic cells (endosymbiosis).
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.14.7:	Relate the structure of each of the major plant organs and tissues to physiological processes.
SC.912.L.14.26:	Identify the major parts of the brain on diagrams or models.
SC.912.L.14.27:	Identify the functions of the major parts of the brain, including the meninges, medulla, pons, midbrain, hypothalamus, thalamus, cerebellum and cerebrum.
SC.912.L.14.36:	Describe the factors affecting blood flow through the cardiovascular system.
SC.912.L.14.52:	Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.
SC.912.L.15.2:	Discuss the use of molecular clocks to estimate how long ago various groups of organisms diverged evolutionarily from one another.
SC.912.L.15.3:	Describe how biological diversity is increased by the origin of new species and how it is decreased by the natural process of extinction.
SC.912.L.15.4:	Describe how and why organisms are hierarchically classified and based on evolutionary relationships.
SC.912.L.15.5:	Explain the reasons for changes in how organisms are classified.
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
SC.912.L.15.8:	Describe the scientific explanations of the origin of life on Earth.
SC.912.L.15.10:	Identify basic trends in hominid evolution from early ancestors six million years ago to modern humans, including brain size, jaw size, language, and manufacture of tools.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.15.14:	Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.16.1:	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.16.3:	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.8:	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.
SC.912.L.16.9:	Explain how and why the genetic code is universal and is common to almost all organisms.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.12:	Describe how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and transformation) is used to construct recombinant DNA molecules (DNA cloning).
SC.912.L.16.13:	Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.
SC.912.L.16.14:	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.
SC.912.L.16.15:	Compare and contrast binary fission and mitotic cell division.
SC.912.L.16.16:	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.
SC.912.L.16.17:	Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation.
SC.912.L.17.2:	Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.5:	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.

SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.2:	Describe the important structural characteristics of monosaccharides, disaccharides, and polysaccharides and explain the functions of carbohydrates in living things.
SC.912.L.18.3:	Describe the structures of fatty acids, triglycerides, phospholipids, and steroids. Explain the functions of lipids in living organisms. Identify some reactions that fatty acids undergo. Relate the structure and function of cell membranes.
SC.912.L.18.4:	Describe the structures of proteins and amino acids. Explain the functions of proteins in living organisms. Identify some reactions that amino acids undergo. Relate the structure and function of enzymes.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.
SC.912.L.18.10:	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
SC.912.N.1.1:	 Define a problem based off a specific body of knowledge, for example, biology, chemistry, physics, and earthrspace science, and do the following. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
LAFS.910.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
LAFS.910.RST.1.2:	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.2.5:	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LAFS.910.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.RST.3.8:	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
LAFS.910.RST.3.9:	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
LAFS.910.RST.4.10:	By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–

LAFS.910.SL.1.1:	 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.910.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.910.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.910.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.910.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
LAFS.910.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.910.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.910.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
MAFS.912.F-IF.2.4:	graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. \star
MAFS.912.F-IF.3.7:	 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.G-MG.1.2:	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. \star
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★
WINE 0.7 12.0-10.2.0.	Represent data with plots on the real number line (dot plots, histograms, and box plots). ★

MAFS.912.S-ID.1.1:	Clarifications:
	characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ★
MAFS.912.S-ID.1.2:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). 🖈
MAFS.912.S-ID.1.3:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. ★
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. \star
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting Reason abstractly and quantitatively
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
MAFS.K12.MP.3.1:	 Construct viable arguments and critique the reasoning of others. Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments. Standard Relation to Course: Supporting
	Model with mathematics.
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
	Stanuard Relation to Course: Supporting

	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
	Evaluate how environment and personal health are interrelated.
HE.912.C.1.3:	Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
	Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases.
HE.912.C.1.5:	Clarifications: Health prevention, detection, and treatment of: breast and testicular cancer, suicide, obesity, and industrial-related chronic disease.
	Analyze how heredity and family history can impact personal health.
HE.912.C.1.7:	Clarifications: Drug use, family obesity, heart disease, mental health, and non-communicable illness or disease.
	Assess the degree of susceptibility to injury, illness, or death if engaging in unhealthy/risky behaviors.
HE.912.C.1.8:	Clarifications: Risks associated with alcohol abuse, including poison, date rape, and death; cancer and chronic lung disease related to tobacco use; overdose from drug use; child abuse or neglect; and dating violence.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

While the content focus of this course is consistent with the Biology I course, students will explore these concepts in greater depth. In general, the academic pace and rigor will be greatly increased for honors level course work. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error: and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- · Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- · Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

SubSubject:

GENERAL INFORMATION

Course Number: 2000320	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject Biological Sciences >
	Abbreviated Title: BIO 1 HON
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
	Class Size Core Required
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	

Educator Certifications

Graduation Requirement: Biology

Science (Secondary Grades 7-12)
Biology (Grades 6-12)
Middle Grades General Science (Middle Grades 5-9)

Equivalent Courses

2000310-Biology 1

Biology 1 Honors (#2000320) 2022 - And Beyond

Name	Description
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
SC.912.L.14.1:	Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.
SC.912.L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).
SC.912.L.14.3:	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.
SC.912.L.14.4:	Compare and contrast structure and function of various types of microscopes.
SC.912.L.14.5:	Explain the evidence supporting the scientific theory of the origin of eukaryotic cells (endosymbiosis).
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.14.7:	Relate the structure of each of the major plant organs and tissues to physiological processes.
SC.912.L.14.26:	Identify the major parts of the brain on diagrams or models.
SC.912.L.14.27:	Identify the functions of the major parts of the brain, including the meninges, medulla, pons, midbrain, hypothalamus, thalamus, cerebellum and cerebrum.
SC.912.L.14.36:	Describe the factors affecting blood flow through the cardiovascular system.
SC.912.L.14.52:	Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.
SC.912.L.15.2:	Discuss the use of molecular clocks to estimate how long ago various groups of organisms diverged evolutionarily from one another.
SC.912.L.15.3:	Describe how biological diversity is increased by the origin of new species and how it is decreased by the natural process of extinction.
SC.912.L.15.4:	Describe how and why organisms are hierarchically classified and based on evolutionary relationships.
SC.912.L.15.5:	Explain the reasons for changes in how organisms are classified.
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
SC.912.L.15.8:	Describe the scientific explanations of the origin of life on Earth.
SC.912.L.15.10:	Identify basic trends in hominid evolution from early ancestors six million years ago to modern humans, including brain size, jaw size, language, and manufacture of tools.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.15.14:	Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.16.1:	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.16.3:	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.8:	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.
SC.912.L.16.9:	Explain how and why the genetic code is universal and is common to almost all organisms.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.12:	Describe how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and transformation) is used to construct recombinant DNA molecules (DNA cloning).
SC.912.L.16.13:	Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.
SC.912.L.16.14:	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.
SC.912.L.16.15:	Compare and contrast binary fission and mitotic cell division.
SC.912.L.16.16:	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.
SC.912.L.16.17:	Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation.
SC.912.L.17.2:	Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.5:	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.

SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.2:	Describe the important structural characteristics of monosaccharides, disaccharides, and polysaccharides and explain the functions of carbohydrates in living things.
SC.912.L.18.3:	Describe the structures of fatty acids, triglycerides, phospholipids, and steroids. Explain the functions of lipids in living organisms. Identify some reactions that fatty acids undergo. Relate the structure and function of cell membranes.
SC.912.L.18.4:	Describe the structures of proteins and amino acids. Explain the functions of proteins in living organisms. Identify some reactions that amino acids undergo. Relate the structure and function of enzymes.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.
SC.912.L.18.10:	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
SC.912.L.18.12:	 Discuss the special properties of water that contribute to Earth's suitability as an environment for life: conesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent. Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
SC 912 N 1 1	5. Plan investigations, (Design and evaluate a scientific investigation).
00.712.11.11.1	b. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs). (Collect data or evidence in an also the generation and interpretation of graphical representations of data, including data tables and graphs).
	organized way. Properly use instruments, equipment, and materials (e.g., scales, proheware, meter sticks, microscopes, computers) including
	set-up, calibration, technique, maintenance, and storage).
	7. Pose answers, explanations, or descriptions of events,
	8. Generate explanations that explicate or describe natural phenomena (inferences),
	9. Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC 012 N 2 1	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial
30.912.10.3.1.	range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
	Mathematicians who participate in effortful learning both individually and with others:
	Analyze the problem in a way that makes sense given the task.
	 Ask questions that will help with solving the task. Ruild perseverance by medifying methods as peeded while solving a challenging task.
	Stay engaged and maintain a positive mindset when working to solve tasks
	 Help and support each other when attempting a new method or approach.
MA.K12.MTR.1.1:	Clarifications
	Teachers who encourage students to participate actively in effortful learning both individually and with others:
	Cultivate a community of growth mindset learners.
	Foster perseverance in students by choosing tasks that are challenging.
	Develop students' ability to analyze and problem solve.
	Recognize students' effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:
	Build understanding through modeling and using manipulatives.
	Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
	 Progress from modeling problems with objects and drawings to using algorithms and equations.

MA K12 MTR 2 1.	Choose a representation based on the given context or purpose
IVIA.N 2.IVI R.2. .	
	Clarifications:
	Help students make connections between concents and representations
	Provide opportunities for students to use manipulatives when investigating concents
	Guide students from concrete to pictorial to abstract representations as understanding progresses.
	 Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency
	Mathematicians who complete tasks with mathematical fluency:
	 Select efficient and appropriate methods for solving problems within the given context. Maintain flavibility and assurage while performing procedures and mental selevilations.
	Maintain nexibility and accurately write performing procedures and mental calculations. Complete tasks accurately and with confidence
WARTZENIR21 • Crosses a secretaria to status to the purpose of the purpose • Crosses a secretaria to status to the purpose • Crosses a secretaria to status to the purpose • Crosses • Purpose a secretaria to status • Crosses • Purpose a secretaria to status • Purpose • Purpose a secretaria to status • Purpose • Purpo	
MA.K12.MTR.3.1:	Use feedback to improve efficiency when performing calculations.
	Clarifications:
	Teachers who encourage students to complete tasks with mathematical fluency:
	Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
	Offer multiple opportunities for students to practice efficient and generalizable methods.
	Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others.
	Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
	Communicate mathematical ideas, vocabulary and methods effectively.
	Analyze the mathematical thinking of others.
	Compare the efficiency of a method to those expressed by others.
MA.K12.MTR.4.1:	Recognize errors and suggest how to correctly solve the task.
	Justify results by explaining methods and processes.
MA.K12.WHX.4.1.	Construct possible arguments based on evidence.
	Clarifications:
	Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:
	Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.
	Create opportunities for students to discuss their thinking with peers. Select oppure and present student work to advance and degree understanding of correct and increasingly officient methods
	 Select, sequence and present student work to advance and deepen understanding or conject and increasingly encient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Like patterns and structure to help understand and compare them responses to the responses of their perior
	Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
	 Focus on relevant details within a problem. Create plans and procedures to logically order events, stone or ideas to solve problems.
	Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts.
	Relate previously learned concepts to new concepts.
	Look for similarities among problems.
MA.K12.MTR.5.1:	Connect solutions of problems to more complicated large-scale situations.
	Clarifications:
MAK12 MIR 2.1: Control and processing of the generation is a second to be been concepts and representations as a second to be been concepts and representations as a show students that windows representations can and edifferent purposes. MAK12 MIR 3.1: Control and support to the second to be been concepts and there are presentations as a show students that windows representations can and edifferent purposes. MAK12 MIR 3.1: Show students that windows representations can have different purposes. MAK12 MIR 3.1: Show students that windows representations can have different purposes. MAK12 MIR 3.1: Show students that and appropriate methods for solving problems within the second students with the file basis accurately while performing procedures and menta is complete tasks to improve efficiency when performing calculations. Chrifteations: Carifications: Transfer with encourage students to complete tasks with mathematical fluency: Adapt procedures of a method to the second the method they used an other multiple opportunities for students to take structure to the method they used an encourage in discussions that reflect on the mathematical fluency: Adapt procedures of a method to those expressed by others. Compare the efficiency of a method to those expressed by others. Construct possible arguments based on evidence. Chrifteations: Transfers who encourage students to engage in discussions that reflect on the estability anopation method stown the tability opportence.	Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:
	Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
	Support students to develop generalizations based on the similarities found among problems.
	Provide opportunities for students to create plans and procedures to solve problems.
	• Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions.
	Mathematicians who assess the reasonableness of solutions:
	Estimate to discover possible solutions.
	Use benchmark quantities to determine if a solution makes sense.
	Check calculations when solving problems.
	Verify possible solutions by explaining the methods used.
MA.K12.MTR.6.1:	Evaluate results based on the given context.
	Clarifications:
	leacners who encourage students to assess the reasonableness of solutions:
	 nave students estimate or predict solutions prior to solving. Prompt students to continually ask "Does this solution make conce? How do you know?"
	Reinforce that students check their work as they progress within and after a task
	 Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts
	Mathematicians who apply mathematics to real-world contexts:
	Connect mathematical concepts to everyday experiences.
1	 Use models and methods to understand, represent and solve problems.

Everage compactions between

MA K12 MTR 7 1-	 Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
IVIA.N 12.1011N.7.1.	 Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
ELA.K12.EE.1.1:	 Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
HE.912.C.1.3:	Evaluate how environment and personal health are interrelated. Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
	Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases.
HE.912.C.1.5:	Clarifications: Health prevention, detection, and treatment of: breast and testicular cancer, suicide, obesity, and industrial-related chronic disease.
HE.912.C.1.7: Analyze how heredity and family history can impact personal health. Clarifications: Drug use, family obesity, heart disease, mental health, and non-communicable illness or disease.	
	Assess the degree of susceptibility to injury, illness, or death if engaging in unhealthy/risky behaviors.
HE.912.C.1.8:	Clarifications: Risks associated with alcohol abuse, including poison, date rape, and death; cancer and chronic lung disease related to tobacco use; overdose from drug use; child abuse or neglect; and dating violence.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD K12 ELL SL1	English language learners communicate for social and instructional nurnoses within the school setting

GENERAL NOTES

While the content focus of this course is consistent with the Biology I course, students will explore these concepts in greater depth. In general, the academic pace and rigor will be greatly increased for honors level course work. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school level a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.

• Obtaining, evaluating, and communicating information.

English Language Development ELD Standards

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

Grade Level(s): 9,10,11,12 Graduation Requirement: Biology

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGl/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

GENERAL INFORMATION	
Course Number: 2000320	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Biological Sciences >
Number of Credits: One (1) credit	Abbreviated Title: BIO 1 HON Course Length: Year (Y) Course Attributes: • Honors • Class Size Core Required
Course Type: Core Academic Course Course Status: State Board Approved	Course Level: 3

Educator Certifications

Science (Secondary Grades 7-12) Biology (Grades 6-12) Middle Grades General Science (Middle Grades 5-9)

Equivalent Courses

2000310-Biology 1

Cambridge AICE Biology 1 AS Level (#2000321) 2018 - And

Beyond (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-advanced/cambridge-international-as-and-a-levels/curriculum/.

GENERAL INFORMATION	
Course Number: 2000321	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Biological Sciences >
Number of Credits: One (1) credit	Abbreviated Title: AICE BIO 1 AS Course Length: Year (Y) Course Attributes:
	Advanced International Certificate of Education (AICE)
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: District-Determined	

Educator Certifications

cience (Secondary Grades 7-12)	
liology (Grades 6-12)	

Equivalent Courses

2000321-Cambridge AICE Biology 1 AS Level Equivalency end year: 2018

Cambridge Pre-AICE Biology IGCSE Level (#2000322) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-secondary-2/cambridge-igcse/curriculum/.

GENERAL INFORMATION

Course Number: 2000322

Number of Credits: One (1) credit

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Biology

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Biological Sciences > Abbreviated Title: PRE-AICE BIO IG Course Length: Year (Y) **Course Attributes:** Advanced International Certificate of Education (AICE) Course Level: 3

Educator Certifications

Science (Secondary Grades 7-12)	
Biology (Grades 6-12)	

Equivalent Courses

2000310-Biology 1

Cambridge AICE Biology 2 A Level (#2000323) 2018 - And Beyond

(current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-advanced/cambridge-international-as-and-a-levels/curriculum/.

GENERAL INFORMATION	
Course Number: 2000323	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Biological Sciences >
Number of Credits: One (1) credit	Abbreviated Title: AICE BIO 2 AL Course Length: Year (Y) Course Attributes:
	Advanced international certificate of Education (AICE)
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: District-Determined	

Educator Certifications

Biology (Grades 6-12)	
Science (Secondary Grades 7-12)	

Equivalent Courses

2000323-Cambridge AICE Biology 2 A Level Equivalency end year: 2018

Biology 2 Honors (#2000330) 2018 - 2022 (current)

Name	Description
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.14.8:	Explain alternation of generations in plants.
SC.912.L.14.9:	Relate the major structure of fungi to their functions.
SC.912.L.14.50:	Describe the structure of vertebrate sensory organs. Relate structure to function in vertebrate sensory systems.
SC.912.L.14.53:	Discuss basic classification and characteristics of plants. Identify bryophytes, pteridophytes, gymnosperms, and angiosperms.
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.
SC.912.L.15.4:	Describe how and why organisms are hierarchically classified and based on evolutionary relationships.
SC.912.L.15.5:	Explain the reasons for changes in how organisms are classified.
SC.912.L.15.7:	Discuss distinguishing characteristics of vertebrate and representative invertebrate phyla, and chordate classes using typical examples.
SC.912.L.15.8:	Describe the scientific explanations of the origin of life on Earth.
SC.912.L.15.9:	Explain the role of reproductive isolation in the process of speciation.
SC.912.L.15.11:	Discuss specific fossil hominids and what they show about human evolution.
SC.912.L.16.6:	Discuss the mechanisms for regulation of gene expression in prokaryotes and eukaryotes at transcription and translation level.
SC.912.L.16.7:	Describe how viruses and bacteria transfer genetic material between cells and the role of this process in biotechnology.
SC.912.L.16.11:	Discuss the technologies associated with forensic medicine and DNA identification, including restriction fragment length polymorphism (RFLP) analysis.
SC.912.L.16.12:	Describe how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and transformation) is used to construct recombinant DNA molecules (DNA cloning).
SC.912.L.16.15:	Compare and contrast binary fission and mitotic cell division.
SC.912.L.17.1:	Discuss the characteristics of populations, such as number of individuals, age structure, density, and pattern of distribution.
SC.912.L.17.3:	Discuss how various oceanic and freshwater processes, such as currents, tides, and waves, affect the abundance of aquatic organisms.
SC.912.L.17.6:	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.
SC.912.L.17.7:	Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.17.10:	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.12:	Discuss the political, social, and environmental consequences of sustainable use of land.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.14:	Assess the need for adequate waste management strategies.
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
SC.912.L.17.17:	Assess the effectiveness of innovative methods of protecting the environment.
SC.912.L.17.18:	Describe how human population size and resource use relate to environmental quality.
SC.912.L.17.19:	Describe how different natural resources are produced and how their rates of use and renewal limit availability.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.5:	Discuss the use of chemiosmotic gradients for ATP production in chloroplasts and mitochondria.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.
SC.912.L.18.10:	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: 1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	 Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	 Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models).
00.010.014.4	5. Plan investigations, (Design and evaluate a scientific investigation).
SC.912.N.1.1:	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the

	 generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). 7. Pose answers, explanations, or descriptions of events, 8. Generate explanations that explicate or describe natural phenomena (inferences), 9. Use appropriate evidence and reasoning to justify these explanations to others, 10. Communicate results of scientific investigations, and 11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.8.10:	Describe oxidation-reduction reactions in living and non-living systems.
LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LAFS.1112.KS1.4.10:	 by the end of grade 12, read and comprehend science/technical texts in the grades 11-12 text complexity band independently and proficiently. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11-12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study: explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.1112.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases.

	 c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole: include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.1112.WHST.2.6:	including new arguments or information.
LAFS.1112.WHST.3.7:	broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively: assess the strengths and
LAFS.1112.WHST.3.8:	limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.1112.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. \bigstar
MAFS.912.F-IF.3.7:	 a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.G-MG.1.2:	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. \star
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. *
MAI 3.712.340.2.0.	Represent data with plots on the real number line (dot plots, histograms, and box plots). ★
MAFS.912.S-ID.1.1:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ★
MAFS.912.S-ID.1.2:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.3:	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). * Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. \star
MAFS.912.S-ID.2.5: MAFS.912.S-ID.2.6:	 Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. ★ Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association.

	Clarifications: Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting
MAFS.K12.MP.2.1:	Reason abstractly and quantitatively. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting
MAFS.K12.MP.4.1:	Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting
MAFS.K12.MP.5.1:	Use appropriate tools strategically. Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
	Look for and make use of structure.
	more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + x^2$
MAFS.K12.MP.7.1:	9x + 14, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 3 – 3(x – y) ² as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
-------------------	--
	Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
	Evaluate how environment and personal health are interrelated.
HE.912.C.1.3:	Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
	Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases.
HE.912.C.1.5:	Clarifications: Health prevention, detection, and treatment of: breast and testicular cancer, suicide, obesity, and industrial-related chronic disease.
	Analyze how heredity and family history can impact personal health.
HE.912.C.1.7:	Clarifications: Drug use, family obesity, heart disease, mental health, and non-communicable illness or disease.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- · Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The course also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2000330

Number of Credits: One (1) credit

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: District-Determined Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Biological Sciences > Abbreviated Title: BIO 2 HON Course Length: Year (Y) Course Attributes: • Honors Course Level: 3

Educator Certifications

Science (Secondary Grades 7-12)	
Biology (Grades 6-12)	

Biology 2 Honors (#2000330) 2022 - And Beyond

Name	Description
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public
	health.
SC.912.L.14.8:	Explain alternation of generations in plants.
SC.912.L.14.9:	Relate the major structure of fungi to their functions.
SC.912.L.14.50:	Describe the structure of vertebrate sensory organs. Relate structure to function in vertebrate sensory systems.
SC.912.L.14.53:	Discuss basic classification and characteristics of plants. Identify bryophytes, pteridophytes, gymnosperms, and angiosperms.
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.
SC.912.L.15.4:	Describe how and why organisms are hierarchically classified and based on evolutionary relationships.
SC.912.L.15.5:	Explain the reasons for changes in how organisms are classified.
SC.912.L.15.7:	Discuss distinguishing characteristics of vertebrate and representative invertebrate phyla, and chordate classes using typical examples.
SC.912.L.15.8:	Describe the scientific explanations of the origin of life on Earth.
SC.912.L.15.9:	Explain the role of reproductive isolation in the process of speciation.
SC.912.L.15.11:	Discuss specific fossil hominids and what they show about human evolution.
SC.912.L.16.6:	Discuss the mechanisms for regulation of gene expression in prokaryotes and eukaryotes at transcription and translation level.
SC.912.L.16.7:	Describe how viruses and bacteria transfer genetic material between cells and the role of this process in biotechnology.
SC.912.L.16.11:	Discuss the technologies associated with forensic medicine and DNA identification, including restriction fragment length polymorphism (RFLP) analysis.
SC.912.L.16.12:	Describe how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and transformation) is used to construct recombinant DNA molecules (DNA cloning).
SC.912.L.16.15:	Compare and contrast binary fission and mitotic cell division.
SC.912.L.17.1:	Discuss the characteristics of populations, such as number of individuals, age structure, density, and pattern of distribution.
SC.912.L.17.3:	Discuss how various oceanic and freshwater processes, such as currents, tides, and waves, affect the abundance of aquatic organisms.
SC.912.L.17.6:	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.
SC.912.L.17.7:	Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.17.10:	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.12:	Discuss the political, social, and environmental consequences of sustainable use of land.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.14:	Assess the need for adequate waste management strategies.
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
SC.912.L.17.17:	Assess the effectiveness of innovative methods of protecting the environment.
SC.912.L.17.18:	Describe how human population size and resource use relate to environmental quality.
SC.912.L.17.19:	Describe how different natural resources are produced and how their rates of use and renewal limit availability.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.5:	Discuss the use of chemiosmotic gradients for ATP production in chloroplasts and mitochondria.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.
SC.912.L.18.10:	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:
	1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
	5. Plan investigations, (Design and evaluate a scientific investigation).
SC.912.N.1.1:	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the

	 generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). 7. Pose answers, explanations, or descriptions of events, 8. Generate explanations that explicate or describe natural phenomena (inferences), 9. Use appropriate evidence and reasoning to justify these explanations to others, 10. Communicate results of scientific investigations, and 11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial
SC 912 N 3 2	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as
SC 912 P 8 10	Describe oxidation-reduction reactions in living and non-living systems
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
NAA K12 MATE 1 1-	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach.
	Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	 Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively.

MA.K12.MTR.4.1:	 Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.

ELA.K12.EE.3.1:	Make inferences to support comprehension.
	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
	Evaluate how environment and personal health are interrelated.
HE.912.C.1.3:	Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
	Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases.
HE.912.C.1.5:	Clarifications: Health prevention, detection, and treatment of: breast and testicular cancer, suicide, obesity, and industrial-related chronic disease.
HE.912.C.1.7:	Analyze how heredity and family history can impact personal health.
	Clarifications: Drug use, family obesity, heart disease, mental health, and non-communicable illness or disease.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data

- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2000220	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2000350	Education Courses > Subject: Science > SubSubject:
	Biological Sciences >
	Abbreviated Title: BIO 2 HON
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
Course Type: Core Academic Course	Course Level: 3
Course Status: State Board Approved	
Grade Level(s): 9,10,11,12	

Educator Certifications

Graduation Requirement: District-Determined

Science (Secondary Grades 7-12) Biology (Grades 6-12)

Pre-Advanced Placement Biology (#2000335) 2018 - And Beyond

(current)

General Course Information and Notes

VERSION DESCRIPTION

The course description for this Pre-Advanced Placement (Pre-AP) course is located on the College Board site at https://pre-ap.collegeboard.org/courses.

GENERAL INFORMATION

Course Number: 2000335

Number of Credits: One (1) credit

Course Type: Elective Course Course Status: Course Approved Grade Level(s): 9 Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Biological Sciences > Abbreviated Title: PRE-AP BIOLOGY Course Length: Year (Y) Course Attributes: • Honors Course Level: 3

Educator Certifications

Biology (Grades 6-12) Middle Grades General Science (Middle Grades 5-9) Science (Secondary Grades 7-12)

Advanced Placement Biology (#2000340) 2018 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The course description for this Advanced Placement courses is located on the College Board site at http://apcentral.collegeboard.com/apc/public/courses/teachers_corner/index.html.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2000240	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2000340	Education Courses > Subject: Science > SubSubject:
	Biological Sciences >
	Abbreviated Title: AP BIO
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Advanced Placement (AP)
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	

Educator Certifications

Graduation Requirement: District-Determined

Science (Secondary Grades 7-12)	
Biology (Grades 6-12)	

Equivalent Courses

2000340-Advanced Placement Biology Equivalency end year: 2018

Anatomy and Physiology (#2000350) 2015 - 2022 (current)

Name	Description
SC.912.L.14.11:	Classify and state the defining characteristics of epithelial tissue, connective tissue, muscle tissue, and nervous tissue.
SC.912.L.14.12:	Describe the anatomy and histology of bone tissue.
SC.912.L.14.13:	Distinguish between bones of the axial skeleton and the appendicular skeleton.
SC.912.L.14.14:	Identify the major bones of the axial and appendicular skeleton.
SC.912.L.14.16:	Describe the anatomy and histology, including ultrastructure, of muscle tissue.
SC.912.L.14.17:	List the steps involved in the sliding filament of muscle contraction.
SC.912.L.14.18:	Describe signal transmission across a myoneural junction.
SC.912.L.14.20:	Identify the major muscles of the human on a model or diagram.
SC.912.L.14.21:	Describe the anatomy, histology, and physiology of the central and peripheral nervous systems and name the major divisions of the nervous system.
SC.912.L.14.23:	Identify the parts of a reflex arc.
SC.912.L.14.24:	Identify the general parts of a synapse and describe the physiology of signal transmission across a synapse.
SC.912.L.14.25:	Identify the major parts of a cross section through the spinal cord.
SC.912.L.14.26:	Identify the major parts of the brain on diagrams or models.
SC.912.L.14.28:	Identify the major functions of the spinal cord.
SC.912.L.14.29:	Define the terms endocrine and exocrine.
SC.912.L.14.30:	Compare endocrine and neural controls of physiology.
SC.912.L.14.32:	Describe the anatomy and physiology of the endocrine system.
SC.912.L.14.33:	Describe the basic anatomy and physiology of the reproductive system.
SC.912.L.14.34:	Describe the composition and physiology of blood, including that of the plasma and the formed elements.
SC.912.L.14.35:	Describe the steps in hemostasis, including the mechanism of coagulation. Include the basis for blood typing and transfusion reactions.
SC.912.L.14.36:	Describe the factors affecting blood flow through the cardiovascular system.
SC.912.L.14.38:	Describe normal heart sounds and what they mean.
SC.912.L.14.39:	Describe hypertension and some of the factors that produce it.
SC.912.L.14.41:	Describe fetal circulation and changes that occur to the circulatory system at birth.
SC.912.L.14.42:	Describe the anatomy and the physiology of the lymph system.
CC 012 L 14 44.	Describe the physiology of the respiratory system including the mechanisms of ventilation, gas exchange, gas transport and the mechanisms that
50.912.L.14.44:	control the rate of ventilation.
SC.912.L.14.46:	Describe the physiology of the digestive system, including mechanical digestion, chemical digestion, absorption and the neural and hormonal mechanisms of control.
SC.912.L.14.47:	Describe the physiology of urine formation by the kidney.
SC.912.L.14.49:	Identify the major functions associated with the sympathetic and parasympathetic nervous systems.
SC.912.L.14.50:	Describe the structure of vertebrate sensory organs. Relate structure to function in vertebrate sensory systems.
SC.912.L.14.51:	Describe the function of the vertebrate integumentary system.
SC.912.L.14.52:	Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.
SC.912.L.16.8:	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:
	1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
	5. Plan investigations, (Design and evaluate a scientific investigation).
SC.912.N.1.1:	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	set-up, calibration, technique, maintenance, and storage).
	7. Pose answers, explanations, or descriptions of events,
	8. Generate explanations that explicate or describe natural phenomena (inferences),
	9. Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC 012 N 1 2	Describe and evolution what characterizes science and its methods
30.712.11.1.2.	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps
LAFS.1112.RST.1.1:	or inconsistencies in the account.

LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and tonics
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LAFS.1112.RST.4.10:	By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.
LAFS.1112.SL.1.1:	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.1112.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.2.5:	beverup and surengment writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.1112.WHST.2.6:	including new arguments or information.
LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively: assess the strengths and
LAFS.1112.WHST.3.8:	limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.1112.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch

MAFS.912.F-IF.2.4:	graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. ★
	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★
	a. Graph linear and quadratic functions and show intercents, maxima, and minima
	 b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
MAFS.912.F-IF.3.7:	c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.
	d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.
	e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and
	amplitude, and using phase shift.
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star
	Represent data with plots on the real number line (dot plots, histograms, and box plots). ★
MAFS.912.S-ID.1.1:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ★
MAFS.912.S-ID.1.2:	Clarifications:
	In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the
	characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
MAFS.912.S-ID.1.3:	Clarifications:
	In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are
	data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. \star
MAFS.912.S-ID.2.5:	marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. *
	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. \star
	a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function
	suggested by the context. Emphasize linear, and exponential models.
	 b. Informally assess the fit of a function by plotting and analyzing residuals. b. Fit a linear function for a context that augments a linear concentration.
MAFS.912.S-ID.2.6:	c. Fit a linear function for a scatter plot that suggests a linear association.
	Clarifications: Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting
	a line to data, students assess how well the model fits by analyzing residuals.
	Make sense of problems and persevere in solving them.
	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They
	analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution
	pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the
	original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students
MAFS.K12.MP.1.1:	the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and
	graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on
	using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems
	using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving
	complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting Reason abstractly and quantitatively.
	Mathematically proficient students make consol of quantities and their relationships in problem situations. They bring two complementary abilities
	to bear on problems involving quantitative relationships; the ability to decontextualize—to abstract a given situation and represent it symbolically
	and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to
MAFS.KT2.MP.2.1:	contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative
	reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others.
	Mathematically proficient students understand and use stated assumptions, definitions, and providually established results in constructions
	arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze
	situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others,
	and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from
MAFS.K12.MP.3.1:	which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct
	logic or reasoning norm that which is nawed, and —in there is a naw in an argument—explain what it is. Elementary students can construct

	arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting Model with mathematics.
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
MAFS.K12.MP.7.1:	Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression x ² + 9x + 14, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – 3(x – y) ² as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y. Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
HE.912.C.1.3:	Evaluate now environment and personal nearth are interrelated. Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
	Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases.
HE.912.C.1.5:	Clarifications: Health prevention, detection, and treatment of: breast and testicular cancer, suicide, obesity, and industrial-related chronic disease
	Analyze how heredity and family history can impact personal health.
HE.912.C.1.7:	Clarifications: Drug use, family obesity, heart disease, mental health, and non-communicable illness or disease.
ELD.K12.ELL.SC.1: ELD.K12.ELL.SI.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science. English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGl/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Course Number: 2000350	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Biological Sciences >	
	Abbreviated Title: ANAT PHYSIO	
Number of Credits: One (1) credit	Course Length: Year (Y)	
Course Type: Core Academic Course	Course Level: 2	
Course Status: Course Approved		
Grade Level(s): 9,10,11,12,30,31		
Graduation Requirement: Equally Rigorous Science		

Educator Certifications

Science (Secondary Grades 7-12)
Biology (Grades 6-12)
Health (Elementary and Secondary Grades K-12)
Health Education (Secondary Grades 7-12)

Anatomy and Physiology (#2000350) 2022 - And Beyond

Name	Description
SC.912.L.14.11:	Classify and state the defining characteristics of epithelial tissue, connective tissue, muscle tissue, and nervous tissue.
SC.912.L.14.12:	Describe the anatomy and histology of bone tissue.
SC.912.L.14.13:	Distinguish between bones of the axial skeleton and the appendicular skeleton.
SC.912.L.14.14:	Identify the major bones of the axial and appendicular skeleton.
SC.912.L.14.16:	Describe the anatomy and histology, including ultrastructure, of muscle tissue.
SC.912.L.14.17:	List the steps involved in the sliding filament of muscle contraction.
SC.912.L.14.18:	Describe signal transmission across a myoneural junction.
SC.912.L.14.20:	Identify the major muscles of the human on a model or diagram.
SC.912.L.14.21:	Describe the anatomy, histology, and physiology of the central and peripheral nervous systems and name the major divisions of the nervous system.
SC.912.L.14.23:	Identify the parts of a reflex arc.
SC.912.L.14.24:	Identify the general parts of a synapse and describe the physiology of signal transmission across a synapse.
SC.912.L.14.25:	Identify the major parts of a cross section through the spinal cord.
SC.912.L.14.26:	Identify the major parts of the brain on diagrams or models.
SC.912.L.14.28:	Identify the major functions of the spinal cord.
SC.912.L.14.29:	Define the terms endocrine and exocrine.
SC.912.L.14.30:	Compare endocrine and neural controls of physiology.
SC.912.L.14.32:	Describe the anatomy and physiology of the endocrine system.
SC.912.L.14.33:	Describe the basic anatomy and physiology of the reproductive system.
SC.912.L.14.34:	Describe the composition and physiology of blood, including that of the plasma and the formed elements.
SC.912.L.14.35:	Describe the steps in hemostasis, including the mechanism of coagulation. Include the basis for blood typing and transfusion reactions.
SC.912.L.14.36:	Describe the factors affecting blood flow through the cardiovascular system.
SC.912.L.14.38:	Describe normal heart sounds and what they mean.
SC.912.L.14.39:	Describe hypertension and some of the factors that produce it.
SC.912.L.14.41:	Describe fetal circulation and changes that occur to the circulatory system at birth.
SC.912.L.14.42:	Describe the anatomy and the physiology of the lymph system.
000101 14 44	Describe the physiology of the respiratory system including the mechanisms of ventilation, gas exchange, gas transport and the mechanisms that
SC.912.L.14.44:	control the rate of ventilation.
SC 0121 14 44	Describe the physiology of the digestive system, including mechanical digestion, chemical digestion, absorption and the neural and hormonal
30.912.L.14.40.	mechanisms of control.
SC.912.L.14.47:	Describe the physiology of urine formation by the kidney.
SC.912.L.14.49:	Identify the major functions associated with the sympathetic and parasympathetic nervous systems.
SC.912.L.14.50:	Describe the structure of vertebrate sensory organs. Relate structure to function in vertebrate sensory systems.
SC.912.L.14.51:	Describe the function of the vertebrate integumentary system.
SC.912.L.14.52:	Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.
SC.912.L.16.8:	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:
	1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
	5. Plan investigations, (Design and evaluate a scientific investigation).
SC.912.N.1.1:	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	set-up, calibration, technique, maintenance, and storage).
	7. Pose answers, explanations, or descriptions of events.
	8. Generate explanations that explicate or describe natural phenomena (inferences).
	9 Use appropriate evidence and reasoning to justify these explanations to others.
	10 Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
	Mathematicians who participate in effortful learning both individually and with others:
	Analyze the problem in a way that makes sense given the task.

	 Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks.
MA.K12.MTR.1.1:	 Help and support each other when attempting a new method or approach. Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:

MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?"
	 Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
NAA K12 NATE 7 1.	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
MA.K12.MTR.7.1:	Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
HE.912.C.1.3:	Evaluate how environment and personal health are interrelated. Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
HE.912.C.1.5:	Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases. Clarifications:

	Health prevention, detection, and treatment of: breast and testicular cancer, suicide, obesity, and industrial-related chronic disease.
	Analyze how heredity and family history can impact personal health.
HE.912.C.1.7:	Clarifications: Drug use, family obesity, heart disease, mental health, and non-communicable illness or disease.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2000350	Courses > Grade Group: Grades 9 to 12 and Adult
	Education Courses > Subject: Science > SubSubject:
	Biological Sciences >
	Abbreviated Title: ANAT PHYSIO
Number of Credits: One (1) credit	Course Length: Year (Y)
Course Type: Core Academic Course	Course Level: 2
Course Status: State Board Approved	
Grade Level(s): 9.10.11.12.30.31	

Graduation Requirement: Equally Rigorous Science

Educator Certifications

Science (Secondary Grades 7-12) Biology (Grades 6-12) Health (Elementary and Secondary Grades K-12) Health Education (Secondary Grades 7-12)

Anatomy and Physiology Honors (#2000360) 2015 - 2022 (current)

Name	Description
SC.912.L.14.11:	Classify and state the defining characteristics of epithelial tissue, connective tissue, muscle tissue, and nervous tissue.
SC.912.L.14.12:	Describe the anatomy and histology of bone tissue.
SC.912.L.14.13:	Distinguish between bones of the axial skeleton and the appendicular skeleton.
SC.912.L.14.14:	Identify the major bones of the axial and appendicular skeleton.
SC.912.L.14.15:	Identify major markings (such as foramina, fossae, tubercles, etc.) on a skeleton. Explain why these markings are important.
SC.912.L.14.16:	Describe the anatomy and histology, including ultrastructure, of muscle tissue.
SC.912.L.14.17:	List the steps involved in the sliding filament of muscle contraction.
SC.912.L.14.18:	Describe signal transmission across a myoneural junction.
SC.912.L.14.19:	Explain the physiology of skeletal muscle.
SC.912.L.14.20:	Identify the major muscles of the human on a model or diagram.
SC.912.L.14.21:	Describe the anatomy, histology, and physiology of the central and peripheral nervous systems and name the major divisions of the nervous system.
SC.912.L.14.22:	Describe the physiology of nerve conduction, including the generator potential, action potential, and the synapse.
SC.912.L.14.23:	Identify the parts of a reflex arc.
SC.912.L.14.25:	Identify the major parts of a cross section through the spinal cord.
00.0401.44.07	Identify the functions of the major parts of the brain, including the meninges, medulla, pons, midbrain, hypothalamus, thalamus, cerebellum and
SC.912.L.14.27:	cerebrum.
SC.912.L.14.28:	Identify the major functions of the spinal cord.
SC.912.L.14.29:	Define the terms endocrine and exocrine.
SC.912.L.14.30:	Compare endocrine and neural controls of physiology.
SC.912.L.14.31:	Describe the physiology of hormones including the different types and the mechanisms of their action.
SC.912.L.14.34:	Describe the composition and physiology of blood, including that of the plasma and the formed elements.
SC.912.L.14.35:	Describe the steps in hemostasis, including the mechanism of coagulation. Include the basis for blood typing and transfusion reactions.
SC.912.L.14.36:	Describe the factors affecting blood flow through the cardiovascular system.
SC.912.L.14.37:	Explain the components of an electrocardiogram.
SC.912.L.14.38:	Describe normal heart sounds and what they mean.
SC.912.L.14.39:	Describe hypertension and some of the factors that produce it.
SC.912.L.14.40:	Describe the histology of the major arteries and veins of systemic, pulmonary, hepatic portal, and coronary circulation.
SC.912.L.14.41:	Describe fetal circulation and changes that occur to the circulatory system at birth.
SC.912.L.14.42:	Describe the anatomy and the physiology of the lymph system.
SC.912.L.14.43:	Describe the histology of the respiratory system.
SC 0121 14 44	Describe the physiology of the respiratory system including the mechanisms of ventilation, gas exchange, gas transport and the mechanisms that
30.912.L.14.44.	control the rate of ventilation.
SC.912.L.14.45:	Describe the histology of the alimentary canal and its associated accessory organs.
SC.912.L.14.46:	Describe the physiology of the digestive system, including mechanical digestion, chemical digestion, absorption and the neural and hormonal
00.0401.44.47	mechanisms of control.
SC.912.L.14.47:	Describe the physiology of urine formation by the kidney.
SC.912.L.14.48:	Describe the anatomy, histology, and physiology of the ureters, the urinary bladder and the urethra.
SC.912.L.14.49:	Identify the major functions associated with the sympathetic and parasympathetic nervous systems.
SC.912.L.14.50:	Describe the structure of vertebrate sensory organs. Relate structure to function in vertebrate sensory systems.
SC.912.L.14.51:	Describe the function of the vertebrate integumentary system.
SC.912.L.14.52:	Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.
SC.912.L.16.8:	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.13:	Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to
	birth and major changes that occur in each trimester of pregnancy.
SC.912.L.18.2:	Describe the important structural characteristics of monosaccharides, disaccharides, and polysaccharides and explain the functions of earbohydrates in living things
	Carbonyurates in inving things.
SC.912.L.18.3:	reactions that fatty acids undergo. Relate the structure and function of cell membranes
	Describe the structures of proteins and amino acids. Explain the functions of proteins in living organisms. Identify some reactions that amino acids
SC.912.L.18.4:	undergo. Relate the structure and function of enzymes.
SC.912.L.18.6:	Discuss the role of anaerobic respiration in living things and in human society.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and
SC.912.L.18.11:	their effect on enzyme activity.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:
	1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).

SC.912.N.1.1:	 Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LAFS.1112.SL.1.1:	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.1112.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic;

	 e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.1112.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and
LAFS.1112.WHST.3.8:	limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.1112.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i>
	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★
	a. Graph linear and quadratic functions and show intercepts, maxima, and minima.
MAFS.912.F-IF.3.7:	 b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.
	 d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.
	e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star
MAFS.912.S-IC.2.6:	Evaluate reports based on data. ★
MAFS.912.S-ID.1.1:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ★
MAFS.912.S-ID.1.2:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). 🖈
MAFS.912.S-ID.1.3:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. ★
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. \star
	 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models. b. Informally assess the fit of a function by plotting and analyzing residuals.
MAFS.912.S-ID.2.6:	c. Fit a linear function for a scatter plot that suggests a linear association.
	Clarifications: Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems and they need they need they need they may and solve a problem. Mathematically proficient students check their answers to problems.

convey a longuidadeable starse in a style that reasonable to the dissipline and contact as well as to the supertise of likely readers.

	complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting Peason abstractly and quantitatively
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others.
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting Model with mathematics
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

	Standard Relation to Course: Supporting
HE.912.C.1.3:	Evaluate how environment and personal health are interrelated.
	Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
	Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases.
HE.912.C.1.5:	Clarifications: Health prevention, detection, and treatment of: breast and testicular cancer, suicide, obesity, and industrial-related chronic disease.
	Analyze how heredity and family history can impact personal health.
HE.912.C.1.7:	Clarifications: Drug use, family obesity, heart disease, mental health, and non-communicable illness or disease.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

While the content focus of this course is consistent with the Anatomy and Physiology course, students will explore these concepts in greater depth. In general, the academic pace and rigor will be greatly increased for honors level course work. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGl/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Course Number: 2000360 Number of Credits: One (1) credit	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Biological Sciences > Abbreviated Title: ANAT PHYSIO HON Course Length: Year (Y) Course Attributes: • Honors
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Educator Certifications

Science (Secondary Grades 7-12)
Biology (Grades 6-12)
Health (Elementary and Secondary Grades K-12)
Health Education (Secondary Grades 7-12)

Anatomy and Physiology Honors (#2000360) 2022 - And Beyond

Name	Description
SC.912.L.14.11:	Classify and state the defining characteristics of epithelial tissue, connective tissue, muscle tissue, and nervous tissue.
SC.912.L.14.12:	Describe the anatomy and histology of bone tissue.
SC.912.L.14.13:	Distinguish between bones of the axial skeleton and the appendicular skeleton.
SC.912.L.14.14:	Identify the major bones of the axial and appendicular skeleton.
SC.912.L.14.15:	Identify major markings (such as foramina, fossae, tubercles, etc.) on a skeleton. Explain why these markings are important.
SC.912.L.14.16:	Describe the anatomy and histology, including ultrastructure, of muscle tissue.
SC.912.L.14.17:	List the steps involved in the sliding filament of muscle contraction.
SC.912.L.14.18:	Describe signal transmission across a myoneural junction.
SC.912.L.14.19:	Explain the physiology of skeletal muscle.
SC.912.L.14.20:	Identify the major muscles of the human on a model or diagram.
SC.912.L.14.21:	Describe the anatomy, histology, and physiology of the central and peripheral nervous systems and name the major divisions of the nervous system.
SC.912.L.14.22:	Describe the physiology of nerve conduction, including the generator potential, action potential, and the synapse.
SC.912.L.14.23:	Identify the parts of a reflex arc.
SC.912.L.14.25:	Identify the major parts of a cross section through the spinal cord.
00.0401.44.07	Identify the functions of the major parts of the brain, including the meninges, medulla, pons, midbrain, hypothalamus, thalamus, cerebellum and
SC.912.L.14.27:	cerebrum.
SC.912.L.14.28:	Identify the major functions of the spinal cord.
SC.912.L.14.29:	Define the terms endocrine and exocrine.
SC.912.L.14.30:	Compare endocrine and neural controls of physiology.
SC.912.L.14.31:	Describe the physiology of hormones including the different types and the mechanisms of their action.
SC.912.L.14.34:	Describe the composition and physiology of blood, including that of the plasma and the formed elements.
SC.912.L.14.35:	Describe the steps in hemostasis, including the mechanism of coagulation. Include the basis for blood typing and transfusion reactions.
SC.912.L.14.36:	Describe the factors affecting blood flow through the cardiovascular system.
SC.912.L.14.37:	Explain the components of an electrocardiogram.
SC.912.L.14.38:	Describe normal heart sounds and what they mean.
SC.912.L.14.39:	Describe hypertension and some of the factors that produce it.
SC.912.L.14.40:	Describe the histology of the major arteries and veins of systemic, pulmonary, hepatic portal, and coronary circulation.
SC.912.L.14.41:	Describe fetal circulation and changes that occur to the circulatory system at birth.
SC.912.L.14.42:	Describe the anatomy and the physiology of the lymph system.
SC.912.L.14.43:	Describe the histology of the respiratory system.
SC 0121 14 44	Describe the physiology of the respiratory system including the mechanisms of ventilation, gas exchange, gas transport and the mechanisms that
30.912.L.14.44.	control the rate of ventilation.
SC.912.L.14.45:	Describe the histology of the alimentary canal and its associated accessory organs.
SC.912.L.14.46:	Describe the physiology of the digestive system, including mechanical digestion, chemical digestion, absorption and the neural and hormonal
00.0401.44.47	mechanisms of control.
SC.912.L.14.47:	Describe the physiology of urine formation by the kidney.
SC.912.L.14.48:	Describe the anatomy, histology, and physiology of the ureters, the urinary bladder and the urethra.
SC.912.L.14.49:	Identify the major functions associated with the sympathetic and parasympathetic nervous systems.
SC.912.L.14.50:	Describe the structure of vertebrate sensory organs. Relate structure to function in vertebrate sensory systems.
SC.912.L.14.51:	Describe the function of the vertebrate integumentary system.
SC.912.L.14.52:	Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.
SC.912.L.16.8:	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.13:	Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to
	birth and major changes that occur in each trimester of pregnancy.
SC.912.L.18.2:	Describe the important structural characteristics of monosaccharides, disaccharides, and polysaccharides and explain the functions of earbohydrates in living things
	Carbonyurates in inving things.
SC.912.L.18.3:	reactions that fatty acids undergo. Relate the structure and function of cell membranes
	Describe the structures of proteins and amino acids. Explain the functions of proteins in living organisms. Identify some reactions that amino acids
SC.912.L.18.4:	undergo. Relate the structure and function of enzymes.
SC.912.L.18.6:	Discuss the role of anaerobic respiration in living things and in human society.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and
SC.912.L.18.11:	their effect on enzyme activity.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:
	1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).

SC.912.N.1.1:	 Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
MA K12 MTP 1 1-	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach.
MA.K12.MTR.1.1:	 Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose.
	 Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.

	Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
	Focus on relevant details within a problem.
	Create plans and procedures to logically order events, steps or ideas to solve problems.
	Decompose a complex problem into manageable parts.
	Relate previously learned concepts to new concepts.
MA.K12.MTR.5.1:	Look for similarities among problems. Connect solutions of problems to more complicated large scale situations
	Connect solutions of problems to more complicated large-scale situations.
	Clarifications: Teachers who encourage students to use patterns and structure to belo understand and connect mathematical concepts:
	 Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
	Support students to develop generalizations based on the similarities found among problems.
	Provide opportunities for students to create plans and procedures to solve problems.
	• Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions.
	Mathematicians who assess the reasonableness of solutions:
	Estimate to discover possible solutions.
	Use benchmark quantities to determine it a solution makes sense. Check calculations when solving problems
	Verify possible solutions by explaining the methods used.
MA.K12.MTR.6.1:	• Evaluate results based on the given context.
	Clarifications:
	Teachers who encourage students to assess the reasonableness of solutions:
	Have students estimate or predict solutions prior to solving.
	 Prompt students to continually ask, "Does this solution make sense? How do you know?" Beinforce that students check their work as they progress within and after a task.
	 Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts
	Mathematicians who apply mathematics to real-world contexts:
	Connect mathematical concepts to everyday experiences.
	 Use models and methods to understand, represent and solve problems.
	• Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or
MA K12 MTR 7 1	efficiency.
WPART2.WITK.7.1.	Clarifications:
	Teachers who encourage students to apply mathematics to real-world contexts:
	 Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods.
	 Support students as they validate conclusions by comparing them to the given situation.
	Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	Clarifications:
	K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details
	from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.
	3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	A-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly
	quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide
	referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications:
	See Text complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the
	girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and
	beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
	Clarifications:
	In kindergarten, students learn to listen to one another respectfully.
ELA.K12.EE.4.1:	collaborative conversations are becoming academic conversations.
	In grades 3-12 students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills
	Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.

ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work.
	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
	Evaluate how environment and personal health are interrelated.
HE.912.C.1.3:	Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
HE.912.C.1.5:	Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases.
	Clarifications: Health prevention, detection, and treatment of: breast and testicular cancer, suicide, obesity, and industrial-related chronic disease.
	Analyze how heredity and family history can impact personal health.
HE.912.C.1.7:	Clarifications: Drug use, family obesity, heart disease, mental health, and non-communicable illness or disease.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

While the content focus of this course is consistent with the Anatomy and Physiology course, students will explore these concepts in greater depth. In general, the academic pace and rigor will be greatly increased for honors level course work. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- · Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and

concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Biological Sciences >	
Abbreviated Title: ANAT PHYSIO HON	
Course Length: Year (Y)	
Course Attributes:	
Honors	
Course Level: 3	
Graduation Requirement: Equally Rigorous Science	

Educator Certifications

Science (Secondary Grades 7-12) Biology (Grades 6-12) Health (Elementary and Secondary Grades K-12) Health Education (Secondary Grades 7-12)

Botany (#2000370) 2015 - 2022 (current)

Name	Description
LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LAFS.1112.RST.4.10:	By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.
LAFS.1112.SL.1.1:	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.1112.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.1112.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information
LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquire when appropriate synthesize multiple sources on the subject demonstrating understanding of the subject under investigation
LAFS.1112.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.1112.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
LAFS.910.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.2.5:	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.RST.3.9:	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
LAFS.910.RST.4.10:	By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.910.WHST.1.2:	 a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
SC.912.L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).
SC.912.L.14.3:	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.
SC.912.L.14.5:	Explain the evidence supporting the scientific theory of the origin of eukaryotic cells (endosymbiosis).
SC.912.L.14.7:	Relate the structure of each of the major plant organs and tissues to physiological processes.
SC.912.L.14.8:	Explain alternation of generations in plants.
SC.912.L.14.9:	Relate the major structure of fungi to their functions.
SC.912.L.14.10:	Discuss the relationship between the evolution of land plants and their anatomy.
SC.912.L.14.53: SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change
SC 912 15 3	Describe how biological diversity is increased by the origin of new species and how it is decreased by the natural process of extinction
SC 912 15 4	Describe how and why organisms are hierarchically classified and based on evolutionary relationships
SC.912.L.15.5:	Explain the reasons for changes in how organisms are classified.
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
SC.912.L.16.1:	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.6:	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.
SC.912.L.17.7:	Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.

SC.912.L.17.10:	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC 912 L 18 5	Discuss the use of chemiosmotic gradients for ATP production in chloroplasts and mitochondria
SC 0121 10 7	Identify the reactants, products, and basis functions of photosynthesis
SC 012 L 10 0	Identify the reactants, products, and basis functions of parcels and apparable collular respiration
SC.912 L 10.0.	Turning the reactains, produces, and basic reflections of aerodic and an area out central respiration.
SC.912.L.18.9:	Explain the interferated nature of photosynthesis and cellular respiration.
SC.912.L.18.10: SC.912.L.18.11:	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell. Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and
	their effect on enzyme activity. Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate
SC.912.L.18.12:	temperature, expansion upon freezing, and versatility as a solvent.
SC.912.N.1.1:	 Define a problem based of a specific body of knowledge, for example, f
CC 012 N 1 2.	Describe and surfair what sharestorizes science and its methods
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.P.8.12:	Describe the properties of the carbon atom that make the diversity of carbon compounds possible.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength,
CC 012 D 12 12	Fundaire beuurgrigue feature quick as apprendition temporature, and preserves of a satellust effect the rate of a shemical resistion.
MAFS.912.F-IF.3.7:	 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.
	e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star
MAFS.K12.MP.1.1:	Make sense of problems and persevere in solving them. Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

	Standard Relation to Course: Supporting
	Construct viable arguments and critique the reasoning of others.
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting
	Model with mathematics.
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
MAFS.K12.MP.7.1:	Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression x^2 + 9x + 14, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – 3(x – y) ² as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
MAFS.K12.MP.8.1:	Look for and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
ELD.K12.ELL.SU.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of science. English language learners communicate for social and instructional purposes within the school setting.

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2000370

Number of Credits: One (1) credit Course Type: Elective Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Biological Sciences > Abbreviated Title: BOTANY Course Length: Year (Y) Course Level: 2

Educator Certifications

Science (Secondary Grades 7-12)	
Biology (Grades 6-12)	
Botany (#2000370) 2022 - And Beyond

Name	Description		
SC.912.L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).		
SC.912.L.14.3:	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.		
SC.912.L.14.5:	Explain the evidence supporting the scientific theory of the origin of eukaryotic cells (endosymbiosis).		
SC.912.L.14.7:	Relate the structure of each of the major plant organs and tissues to physiological processes.		
SC.912.L.14.8:	Explain alternation of generations in plants.		
SC.912.L.14.9:	Relate the major structure of fungi to their functions.		
SC.912.L.14.10:	Discuss the relationship between the evolution of land plants and their anatomy.		
SC.912.L.14.53:	Discuss basic classification and characteristics of plants. Identify bryophytes, pteridophytes, gymnosperms, and angiosperms.		
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.		
SC.912.L.15.3:	Describe how biological diversity is increased by the origin of new species and how it is decreased by the natural process of extinction.		
SC.912.L.15.4:	Describe how and why organisms are hierarchically classified and based on evolutionary relationships.		
SC.912.L.15.5:	Explain the reasons for changes in how organisms are classified.		
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.		
SC.912.L.16.1:	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.		
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.		
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.		
SC.912.L.17.6:	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.		
SC.912.L.17.7:	Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.		
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.		
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.		
SC.912.L.17.10:	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.		
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.		
SC.912.L.18.5:	Discuss the use of chemiosmotic gradients for ATP production in chloroplasts and mitochondria.		
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.		
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.		
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.		
SC.912.L.18.10:	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.		
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.		
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.		
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the 		
	 generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). 7. Pose answers, explanations, or descriptions of events, 8. Generate explanations that explicate or describe natural phenomena (inferences), 9. Use appropriate evidence and reasoning to justify these explanations to others, 10. Communicate results of scientific investigations, and 11. Evaluate the merits of the explanations produced by others. 		
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.		
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.		
SC.912.P.8.12:	Describe the properties of the carbon atom that make the diversity of carbon compounds possible.		

SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.		
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength,		
SC 912 P 12 12	trequency, and energy, and relate them to phenomena and applications. Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction		
00.712.11.12.12.	Mathematicians who participate in effortful learning both individually and with others:		
	Analyze the problem in a way that makes sense given the task.		
	Ask questions that will help with solving the task.		
	Build perseverance by modifying methods as needed while solving a challenging task.		
	Stay engaged and maintain a positive mindset when working to solve tasks.		
MA.K12.MTR.1.1:	Heip and support each other when attempting a new method or approach.		
	Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others:		
	 Cultivate a community of growth mindset learners. 		
	• Foster perseverance in students by choosing tasks that are challenging.		
	Develop students' ability to analyze and problem solve.		
	Recognize students' effort when solving challenging problems.		
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:		
	Build understanding through modeling and using manipulatives.		
	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. 		
	Progress from modeling problems with objects and drawings to using algorithms and equations.		
	Express connections between concepts and representations.		
MA.K12.MTR.2.1:	Choose a representation based on the given context or purpose.		
	Clarifications:		
	Help students make connections between concents and representations		
	 Provide opportunities for students to use manipulatives when investigating concepts. 		
	Guide students from concrete to pictorial to abstract representations as understanding progresses.		
	Show students that various representations can have different purposes and can be useful in different situations.		
	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:		
	Solart officient and appropriate methods for solving problems within the given context		
	Maintain flexibility and accuracy while performing procedures and mental calculations.		
	Complete tasks accurately and with confidence.		
	Adapt procedures to apply them to a new context.		
MA.KT2.WITK.3.T.	Use feedback to improve efficiency when performing calculations.		
	Clarifications:		
	 Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. 		
	 Offer multiple opportunities for students to practice efficient and generalizable methods. 		
	• Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.		
	Engage in discussions that reflect on the mathematical thinking of self and others.		
	Communicate method ideas vessions that reflect on the mathematical minking of son and others.		
	Analyze the mathematical thinking of others.		
	Compare the efficiency of a method to those expressed by others.		
	Recognize errors and suggest how to correctly solve the task.		
MA.K12.MTR.4.1:	Justify results by explaining methods and processes.		
	Construct possible arguments based on evidence.		
	Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:		
	 Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. 		
	Create opportunities for students to discuss their thinking with peers.		
	• Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.		
	• Develop students' ability to justify methods and compare their responses to the responses of their peers.		
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:		
	Focus on relevant details within a problem.		
	Create plans and procedures to logically order events, steps or ideas to solve problems.		
	Decompose a complex problem into manageable parts.		
MA.K12.MTR.5.1:	Relate previously learned concepts to new concepts.		
	 Look for similarities among problems. Connect colutions of problems to more complicated large coale situations. 		
	Connect solutions of problems to more complicated large-scale situations.		
	Utarmications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concents:		
	 Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. 		
•			

	 Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving.
	 Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems
MA K12 MTR 7 1	 Ose models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
	 Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1: Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.	
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work.
	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2000370

Number of Credits: One (1) credit Course Type: Elective Course Course Status: State Board Approved Grade Level(s): 9,10,11,12 Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Biological Sciences > Abbreviated Title: BOTANY Course Length: Year (Y) Course Level: 2

Educator Certifications

Science (Secondary Grades 7-12) Biology (Grades 6-12)

Ecology (#2000380) 2015 - 2022 (current)

Name	Description
LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LAFS.1112.RST.4.10:	By the end of grade 12, read and comprehend science/technical texts in the grades 11-12 text complexity band independently and proficiently.
LAFS.1112.SL.1.1:	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.1112.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most
LAFS.1112.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information
LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.1112.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.1112.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
LAFS.910.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	context relevant to grades 9–10 texts and topics.
LAFS.910.RST.2.5:	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LAFS.910.RST.3.7:	I ranslate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.RST.4.10:	By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted
LAFS.910.SL.2.4:	evidence. Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development substance, and style are appropriate to purpose audience, and task
LAFS.910.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings reasoning, and evidence and to add interest.
LAFS.910.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
SC.912.L.15.12:	List the conditions for Hardy-Weinberg equilibrium in a population and why these conditions are not likely to appear in nature. Use the Hardy- Weinberg equation to predict genotypes in a population from observed phenotypes.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.15.14:	Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.17.1:	Discuss the characteristics of populations, such as number of individuals, age structure, density, and pattern of distribution.
SC.912.L.17.2:	Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.
SC.912.L.17.3:	Discuss how various oceanic and freshwater processes, such as currents, tides, and waves, affect the abundance of aquatic organisms.
SC.9121.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession. Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying
56.712.E.17.6.	capacity.
SC.912.L.17.6:	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels
SC 012 17 10.	and the reduction of available energy at successive in opinic revers.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
SC.912.L.17.17:	Assess the effectiveness of innovative methods of protecting the environment.
SC.912.L.17.19:	Describe how different natural resources are produced and how their rates of use and renewal limit availability.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: 1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;

SC.912.N.1.1:	 conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★
MAFS.912.F-IF.3.7:	 a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star
MAFS.K12.MP.1.1:	Make sense of problems and persevere in solving them. Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting
MAFS.K12.MP.2.1:	Reason abstractly and quantitatively. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Construct viable arguments and critique the reasoning of others.

ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
MAFS.K12.MP.7.1: MAFS.K12.MP.8.1:	9x + 14, order students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y. Standard Relation to Course: Supporting Look for and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation ($y - 2$)/($x - 1$) = 3. Noticing the regularity in the way terms cancel when expanding ($x - 1$)($x + 1$), ($x - 1$)($x^2 + x + 1$), and ($x - 1$)($x^3 + x^2 + x + 1$) might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results. Standard Relation to Course: Supporting
	Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression x ² +
MAFS.K12.MP.6.1:	Attend to precision. Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions. Standard Relation to Course: Supporting
MAFS.K12.MP.5.1:	Use appropriate tools strategically. Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
MAFS.K12.MP.4.1:	Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose. Standard Relation to Course: Supporting
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental

procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2000380

Number of Credits: One (1) credit Course Type: Elective Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Biological Sciences > Abbreviated Title: ECOLOGY Course Length: Year (Y) Course Level: 2

Educator Certifications

Science (Secondary Grades 7-12)	
Biology (Grades 6-12)	

Ecology (#2000380) 2022 - And Beyond

Name	Description		
SC.912.L.15.12:	List the conditions for Hardy-Weinberg equilibrium in a population and why these conditions are not likely to appear in nature. Use the Hardy- Weinberg equation to predict genotypes in a population from observed phenotypes.		
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.		
SC.912.L.15.14:	Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.		
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.		
SC.912.L.17.1:	Discuss the characteristics of populations, such as number of individuals, age structure, density, and pattern of distribution.		
SC.912.L.17.2:	Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.		
SC.912.L.17.3:	Discuss how various oceanic and freshwater processes, such as currents, tides, and waves, affect the abundance of aquatic organisms.		
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.		
SC.912.L.17.5:	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.		
SC.912.L.17.6:	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.		
SC.912.L.17.7:	Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.		
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.		
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.		
SC.912.L.17.10:	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.		
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.		
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.		
SC.912.L.17.17:	Assess the effectiveness of innovative methods of protecting the environment.		
SC.912.L.17.19:	Describe how different natural resources are produced and how their rates of use and renewal limit availability.		
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:		
SC.912.N.1.1:	 Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, 		
	10. Communicate results of scientific investigations, and		
	11. Evaluate the merits of the explanations produced by others.		
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.		
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.		
SC.912.N.1.4:	Identity sources of information and assess their reliability according to the strict standards of scientific investigation.		
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.		
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.		
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.		
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).		
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.		
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.		
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.		
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.		
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.		

SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.	
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.	
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.	
	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task 	
	 Ask questions that will help with solving the task. 	
	Build perseverance by modifying methods as needed while solving a challenging task.	
	Stay engaged and maintain a positive mindset when working to solve tasks.	
MA.K12.MTR.1.1:	Help and support each other when attempting a new method or approach.	
	Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others:	
	Cultivate a community of growth mindset learners.	
	Foster perseverance in students by choosing tasks that are challenging.	
	 Develop students' ability to analyze and problem solve. Becognize students' effort when solving challenging problems 	
	Necognize students enore when solving chanenging problems.	
	Mathematicians who demonstrate understanding by representing problems in multiple ways:	
	Build understanding through modeling and using manipulatives.	
	Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.	
	 Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. 	
MA.K12.MTR.2.1:	Choose a representation based on the given context or purpose.	
	Clarifications:	
	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:	
	 Provide opportunities for students to use manipulatives when investigating concepts. 	
	Guide students from concrete to pictorial to abstract representations as understanding progresses.	
	Show students that various representations can have different purposes and can be useful in different situations.	
	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:	
	Select efficient and appropriate methods for solving problems within the given context.	
	Maintain flexibility and accuracy while performing procedures and mental calculations.	
	Complete tasks accurately and with confidence.	
MA.K12.MTR.3.1:	 Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. 	
	Clarifications:	
	Teachers who encourage students to complete tasks with mathematical fluency:	
	Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.	
	 Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used 	
	Engage in discussions that reflect on the mathematical thinking of self and others.	
	Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:	
	Communicate mathematical ideas, vocabulary and methods effectively.	
	Analyze the mathematical thinking of others.	
	 Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task 	
	 Justify results by explaining methods and processes. 	
MA.K12.MTR.4.1:	Construct possible arguments based on evidence.	
	Clarifications:	
	 Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. 	
	Create opportunities for students to discuss their thinking with peers.	
	• Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.	
	Develop students' ability to justify methods and compare their responses to the responses of their peers.	
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:	
	Focus on relevant details within a problem.	
	Create plans and procedures to logically order events, steps or ideas to solve problems.	
	 Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. 	
	 Keiste previously learned concepts to new concepts. Look for similarities among problems. 	
MA.K12.MTR.5.1:	Connect solutions of problems to more complicated large-scale situations.	
	Clarifications:	
1	reachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:	

	 Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. 	
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to unif is colutions the progress within and after a task.	
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines. 	
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.	
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.	
ELA.K12.EE.3.1:	Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.	
Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and an Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.		
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.	
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.	

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number 2000200	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2000380	Education Courses > Subject: Science > SubSubject:
	Biological Sciences >
	Abbreviated Title: ECOLOGY
Number of Credits: One (1) credit	Course Length: Year (Y)
Course Type: Elective Course	Course Level: 2
Course Status: State Board Approved	

Educator Certifications

Grade Level(s): 9,10,11,12

Science (Secondary Grades 7-12)
Biology (Grades 6-12)

Zoology (#2000410) 2015 - 2022 (current)

Name	Description
LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LAFS.1112.RST.4.10:	By the end of grade 12, read and comprehend science/technical texts in the grades 11-12 text complexity band independently and proficiently.
LAFS.1112.SL.1.1:	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.1112.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.1112.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.1112.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.1112.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline specific tasks, purposes, and audiences
LAFS.910.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.2.5:	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.RST.4.10:	By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.
LAFS.910.SL.1.1:	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.910.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
SC.912.L.14.5:	Explain the evidence supporting the scientific theory of the origin of eukaryotic cells (endosymbiosis).
SC.912.L.14.26:	Identify the major parts of the brain on diagrams or models.
SC.912.L.14.36:	Describe the factors affecting blood flow through the cardiovascular system.
SC.912.L.14.44:	Describe the physiology of the respiratory system including the mechanisms of ventilation, gas exchange, gas transport and the mechanisms that control the rate of ventilation.
SC.912.L.14.50:	Describe the structure of vertebrate sensory organs. Relate structure to function in vertebrate sensory systems.
SC.912.L.14.51:	Describe the function of the vertebrate integumentary system.
SC.912.L.15.1:	Explain now the scientific theory of evolution is supported by the tossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.
SC.912.L.15.3: SC.912.L.15.4	Describe how biological give sity is increased by the origin of new species and now it is decreased by the natural process of extinction. Describe how and why organisms are hierarchically classified and based on evolutionary relationships
SC.912.L.15.5:	Explain the reasons for changes in how organisms are classified.
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
SC.912.L.15.7:	Discuss distinguishing characteristics of vertebrate and representative invertebrate phyla, and chordate classes using typical examples.
SC 0121 15 11.	Discuss specific fossil hominids and what they show about human evolution.

SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.15.14:	Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.17.7:	Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
	The Evaluate the ments of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
MAFS.912.F-IF.3.7:	 a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting
MAFS.K12.MP.2.1:	Reason abstractly and quantitatively. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Construct viable arguments and critique the reasoning of others.
	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others,

MAFS.K12.MP.3.1:	and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting
MAFS.K12.MP.4.1:	Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
ELD.KT2.ELL.SC.T:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
CEDINIE.EEC.JLL.	English rangaage fourthers commandate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a

growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2000410

Number of Credits: One (1) credit Course Type: Elective Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Biological Sciences > Abbreviated Title: ZOOLOGY Course Length: Year (Y) Course Level: 2

Educator Certifications

Science (Secondary Grades 7-12)
Biology (Grades 6-12)
Middle Grades General Science (Middle Grades 5-9)

Zoology (#2000410) 2022 - And Beyond

Course Standards

Name	Description
SC.912.L.14.5:	Explain the evidence supporting the scientific theory of the origin of eukaryotic cells (endosymbiosis).
SC.912.L.14.12:	Describe the anatomy and histology of bone tissue.
SC.912.L.14.26:	Identify the major parts of the brain on diagrams or models.
SC.912.L.14.36:	Describe the factors affecting blood flow through the cardiovascular system.
SC.912.L.14.44:	Describe the physiology of the respiratory system including the mechanisms of ventilation, gas exchange, gas transport and the mechanisms that control the rate of ventilation.
SC.912.L.14.50:	Describe the structure of vertebrate sensory organs. Relate structure to function in vertebrate sensory systems.
SC.912.L.14.51:	Describe the function of the vertebrate integumentary system.
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.
SC.912.L.15.3:	Describe how biological diversity is increased by the origin of new species and how it is decreased by the natural process of extinction.
SC.912.L.15.4:	Describe how and why organisms are hierarchically classified and based on evolutionary relationships.
SC.912.L.15.5:	Explain the reasons for changes in how organisms are classified.
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
SC.912.L.15.7:	Discuss distinguishing characteristics of vertebrate and representative invertebrate phyla, and chordate classes using typical examples.
SC.912.L.15.11:	Discuss specific fossil hominids and what they show about human evolution.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.15.14:	Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.17.7:	Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.
SC.912.N.1.1:	 Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
MA.K12.MTR.1.1:	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach. Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve.

	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:
MA.K12.MTR.2.1:	 Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose.
	 Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:
MA.K12.MTR.3.1:	 Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations.
	 Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence.
	 Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations.
	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving.

	Reinforce that students check their work as they progress within and after a task.Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts:
	 Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
	Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work.
	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD K12 ELL SC 1	
LED.RT2.EEE.30.T.	English language learners communicate information, ideas and concepts necessary for academic success in the content area of science.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2000410

Number of Credits: One (1) credit Course Type: Elective Course Course Status: State Board Approved Grade Level(s): 9,10,11,12 Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Biological Sciences > Abbreviated Title: ZOOLOGY Course Length: Year (Y) Course Level: 2

Educator Certifications

Science (Secondary Grades 7-12)
Biology (Grades 6-12)
Middle Grades General Science (Middle Grades 5-9)

Biology Technology (#2000430) 2015 - 2022 (current)

Name	Description
SC.912.L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).
SC.912.L.14.3:	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.
SC.912.L.14.4:	Compare and contrast structure and function of various types of microscopes.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.14.7:	Relate the structure of each of the major plant organs and tissues to physiological processes.
SC.912.L.14.26:	Identify the major parts of the brain on diagrams or models.
SC.912.L.14.36:	Describe the factors affecting blood flow through the cardiovascular system.
SC.912.L.14.52:	Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.
SC.912.L.15.4:	Describe how and why organisms are hierarchically classified and based on evolutionary relationships.
SC.912.L.15.5:	Explain the reasons for changes in how organisms are classified.
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
SC.912.L.15.8:	Describe the scientific explanations of the origin of life on Earth.
SC.912.L.15.10:	Identify basic trends in hominid evolution from early ancestors six million years ago to modern humans, including brain size, jaw size, language, and manufacture of tools.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.15.14:	Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.16.1:	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.16.3:	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.6:	Discuss the mechanisms for regulation of gene expression in prokaryotes and eukaryotes at transcription and translation level.
SC.912.L.16.7:	Describe how viruses and bacteria transfer genetic material between cells and the role of this process in biotechnology.
SC.912.L.16.8:	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.
SC.912.L.16.9:	Explain how and why the genetic code is universal and is common to almost all organisms.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.11:	Discuss the technologies associated with forensic medicine and DNA identification, including restriction fragment length polymorphism (RFLP) analysis.
SC.912.L.16.12:	Describe how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and transformation) is used to construct recombinant DNA molecules (DNA cloning).
SC.912.L.16.13:	Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.
SC.912.L.16.14:	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.
SC.912.L.16.16:	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.
SC.912.L.16.17:	Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation.
SC.912.L.17.2:	Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.5:	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.6:	Discuss the role of anaerobic respiration in living things and in human society.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.

SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.
SC.912.L.18.10:	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate
	temperature, expansion upon freezing, and versatility as a solvent.
	 Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations. (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
SC 012 N 1 1	5. Plan investigations, (Design and evaluate a scientific investigation).
30.712.11.1.1.	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	set-up, calibration, technique, maintenance, and storage).
	7. Pose answers, explanations, or descriptions of events,
	8. Generate explanations that explicate or describe natural phenomena (inferences),
	9. Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported
SC 912 N 4 1 [.]	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making
	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as
SC.912.N.4.2:	human, economic, and environmental.
SC.912.P.12.12:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.
LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the
LAFS.1112.RST.1.3:	specific results based on explanations in the text.
LAFS.1112.RST.2.4:	context relevant to grades 11-12 texts and topics.
LAFS.1112.RST.3.7:	address a question or solve a problem.
	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
	a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a
	unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
	b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other
	Information and examples appropriate to the audience's knowledge of the topic.
LAFS.1112.WHST.1.2:	complex ideas and concepts.
	d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic;
	convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.
	e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications
	or the significance of the topic).
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.910.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.2.5:	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.RST.4.10:	By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.

LAFS.910.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★
MAFS.912.F-IF.3.7:	 a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. \star
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★
MAFS.K12.MP.1.1:	Make sense of problems and persevere in solving them. Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Construct viable arguments and critique the reasoning of others.
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments commands to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting Model with mathematics.
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Use appropriate tools strategically.

MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression x^2 + 9x + 14, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
MAFS.K12.MP.8.1:	Look for and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
HE.912.C.1.3:	Evaluate how environment and personal health are interrelated. Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
	Evaluate the relationship between access to health care and health status.
HE.912.C.1.6:	Clarifications: Early detection and treatment of cancer, HIV, diabetes, bipolar disorder, schizophrenia, childhood disease or illness, and first-responder care.
	Assess the degree of susceptibility to injury, illness, or death if engaging in unhealthy/risky behaviors.
HE.912.C.1.8:	Clarifications: Risks associated with alcohol abuse, including poison, date rape, and death; cancer and chronic lung disease related to tobacco use; overdose from drug use; child abuse or neglect; and dating violence.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

• Asking questions (for science) and defining problems (for engineering).

- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	00
Course Number: 2000/20	Со
Course Number: 2000430	Ed
	Bio
Number of Credits: One (1) credit	Ab
	Co
	Co
	•
Course Type: Core Academic Course	Co
a a b b b b b b b b b b	

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Biology Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Biological Sciences > Abbreviated Title: BIO TECH Course Length: Year (Y) Course Attributes: • Class Size Core Required Course Level: 2

Educator Certifications

Science (Secondary Grades 7-12)	
Biology (Grades 6-12)	

Equivalent Courses

2000310-Biology 1

Biology Technology (#2000430) 2022 - And Beyond

Name	Description
SC.912.L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).
SC.912.L.14.3:	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.
SC.912.L.14.4:	Compare and contrast structure and function of various types of microscopes.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.14.7:	Relate the structure of each of the major plant organs and tissues to physiological processes.
SC.912.L.14.26:	Identify the major parts of the brain on diagrams or models.
SC.912.L.14.36:	Describe the factors affecting blood flow through the cardiovascular system.
SC.912.L.14.52:	Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.
SC.912.L.15.4:	Describe how and why organisms are hierarchically classified and based on evolutionary relationships.
SC.912.L.15.5:	Explain the reasons for changes in how organisms are classified.
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
SC.912.L.15.8:	Describe the scientific explanations of the origin of life on Earth.
SC.912.L.15.10:	Identify basic trends in hominid evolution from early ancestors six million years ago to modern humans, including brain size, jaw size, language, and manufacture of tools.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.15.14:	Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.16.1:	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.16.3:	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.
SC 012 L 17 4.	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic
SC.912.L.16.4:	changes in offspring.
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.6:	Discuss the mechanisms for regulation of gene expression in prokaryotes and eukaryotes at transcription and translation level.
SC.912.L.16.7:	Describe how viruses and bacteria transfer genetic material between cells and the role of this process in biotechnology.
SC.912.L.16.8:	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.
SC.912.L.16.9:	Explain how and why the genetic code is universal and is common to almost all organisms.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.11:	Discuss the technologies associated with forensic medicine and DNA identification, including restriction fragment length polymorphism (RFLP) analysis.
SC.912.L.16.12:	Describe how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and transformation) is used to construct recombinant DNA molecules (DNA cloning).
SC.912.L.16.13:	Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.
SC.912.L.16.14:	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.
SC.912.L.16.16:	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.
SC.912.L.16.17:	Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation.
SC.912.L.17.2:	Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.5:	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.6:	Discuss the role of anaerobic respiration in living things and in human society.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.

SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.
SC.912.L.18.10:	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate
	temperature, expansion upon freezing, and versatility as a solvent.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:
	Pose questions about the natural world, (Anculate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations: (Write precedures that are clear and replicable, Identify observables and examine relationships between
	2. Conduct systematic observations, (while procedures that are clear and replicable, identify observables and examine relationships between test (independent) variable, and examine relationships between
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines)
	3 Evamine books and other sources of information to see what is already known
	A Review what is known in light of empirical evidence. (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
	5. Plan investigations, (Design and evaluate a scientific investigation).
SC.912.N.1.1:	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	set-up, calibration, technique, maintenance, and storage).
	7. Pose answers, explanations, or descriptions of events,
	8. Generate explanations that explicate or describe natural phenomena (inferences),
	9. Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical
SC.912.N.1.3:	thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as
	questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported
CO 010 N 4 1	descriptions.
50.912.10.4.1:	Explain now sciencific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	human, economic, and environmental.
SC.912.P.12.12:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.
	Mathematicians who participate in effortful learning both individually and with others:
	Analyze the problem in a way that makes sense given the task.
	Ask questions that will help with solving the task.
	 Build perseverance by modifying methods as needed while solving a challenging task.
	 Stay engaged and maintain a positive mindset when working to solve tasks.
	Help and support each other when attempting a new method or approach.
IVIA.N 12.IVITR.1.1.	Clarifications:
	Teachers who encourage students to participate actively in effortful learning both individually and with others:
	Cultivate a community of growth mindset learners.
	Foster perseverance in students by choosing tasks that are challenging.
	Develop students' ability to analyze and problem solve.
	• Recognize students errort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways.
	Mathematicians who demonstrate understanding by representing problems in multiple ways:
	Build understanding through modeling and using manipulatives.
	Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
	 Progress from modeling problems with objects and drawings to using algorithms and equations.
	Express connections between concepts and representations.
MA.K12.MTR.2.1:	Choose a representation based on the given context or purpose.
	Clarifications:
	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:
	Help students make connections between concepts and representations.
	Provide opportunities for students to use manipulatives when investigating concepts.
	Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can have students that various representations can have different purposes and can have students.
	 Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency.
	iviatnematicians who complete tasks with mathematical fluency:
	Select efficient and appropriate methods for solving problems within the given context.

MA.K12.MTR.3.1:	 Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence.
	 Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations.
	Clarifications:
	Teachers who encourage students to complete tasks with mathematical fluency:
	 Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple appendix provide to practice efficient and generalizable methods.
	 Other multiple opportunities for students to plactice enclent and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others.
	 Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes
MA.K12.MTR.4.1:	 Construct possible arguments based on evidence.
	 Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
MA.K12.MTR.5.1:	 Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems.
	 Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context.
	Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts:
MA.K12.MTR.7.1:	 Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
	Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.

ELA.K12.EE.1.1:	2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
	Evaluate how environment and personal health are interrelated.
HE.912.C.1.3:	Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
	Evaluate the relationship between access to health care and health status.
HE.912.C.1.6:	Clarifications: Early detection and treatment of cancer, HIV, diabetes, bipolar disorder, schizophrenia, childhood disease or illness, and first-responder care.
	Assess the degree of susceptibility to injury, illness, or death if engaging in unhealthy/risky behaviors.
HE.912.C.1.8:	Clarifications: Risks associated with alcohol abuse, including poison, date rape, and death; cancer and chronic lung disease related to tobacco use; overdose from drug use; child abuse or neglect; and dating violence.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.

- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2000430

Number of Credits: One (1) credit

Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Biology Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Biological Sciences > Abbreviated Title: BIO TECH Course Length: Year (Y) Course Attributes: • Class Size Core Required Course Level: 2

Educator Certifications

Science (Secondary Grades 7-12) Biology (Grades 6-12)

Equivalent Courses

2000310-Biology 1

Genetics Honors (#2000440) 2015 - 2022 (current)

Name	Description
SC.912.L.15.8:	Describe the scientific explanations of the origin of life on Earth.
SC.912.L.15.9:	Explain the role of reproductive isolation in the process of speciation.
SC 012 15 12	List the conditions for Hardy-Weinberg equilibrium in a population and why these conditions are not likely to appear in nature. Use the Hardy-
56.712.E.15.12.	Weinberg equation to predict genotypes in a population from observed phenotypes.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.15.14:	Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.16.1:	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.16.3:	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.6:	Discuss the mechanisms for regulation of gene expression in prokaryotes and eukaryotes at transcription and translation level.
SC.912.L.16.7:	Describe how viruses and bacteria transfer genetic material between cells and the role of this process in biotechnology.
SC.912.L.16.8:	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.
SC.912.L.16.9:	Explain how and why the genetic code is universal and is common to almost all organisms.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.11:	Discuss the technologies associated with forensic medicine and DNA identification, including restriction fragment length polymorphism (RFLP) analysis.
SC.912.L.16.12:	Describe how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and transformation) is used to construct recombinant DNA molecules (DNA cloning).
SC.912.L.16.14:	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.
SC.912.L.16.16:	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.
SC.912.L.16.17:	Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation.
SC.912.L.17.1:	Discuss the characteristics of populations, such as number of individuals, age structure, density, and pattern of distribution.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of
	invasive, non-native species.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
SC.912.N.1.1:	 Derine a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC 912 N 1 2	Describe and explain what characterizes science and its methods
SC 912 N 2 1	Identify what is science, what clearly is not science, and what superficially recembles science, but fails to most the criteria for science)
00.712.11.2.1.	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation such as
SC.912.N.2.2:	questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.P.12.12:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.

LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and tonics
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LAFS.1112.RST.4.10:	 By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study: explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as
LAFS.1112.SL.1.1:	 needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.1112.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.1112.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively: assess the strengths and
LAFS.1112.WHST.3.8:	limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.1112.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
----------------------	---
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts: intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i>
	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★
	a. Graph linear and quadratic functions and show intercepts, maxima, and minima.
MAFS.912.F-IF.3.7:	 b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.
	 d. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.
	e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and
	amplitude, and using phase shift.
MAFS.912.G-MG.1.2:	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas;
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star
MAFS.912.S-IC.2.6:	Evaluate reports based on data. ★
	Represent data with plots on the real number line (dot plots, histograms, and box plots). ★
MAFS.912.S-ID.1.1:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. \star
MAFS.912.S-ID.1.2:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
MAFS.912.S-ID.1.3:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. \star
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.
	a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function
	suggested by the context. Emphasize linear, and exponential models.
	b. Informally assess the fit of a function by plotting and analyzing residuals.
MAFS.912.S-ID.2.6:	c. Fit a linear function for a scatter plot that suggests a linear association.
	Clarifications: Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and
	graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others.
	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing

MAFS.K12.MP.3.1:	arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.	
	Model with mathematics.	
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.	
	Standard Relation to Course: Supporting Use appropriate tools strategically.	
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting	
	Attend to precision.	
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.	
	Standard Relation to Course: Supporting	
MAFS.K12.MP.7.1:	Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression x ² + 9x + 14, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – 3(x – y) ² as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y. Standard Relation to Course: Supporting	
	Look for and express regularity in repeated reasoning.	
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.	
	Standard Relation to Course: Supporting	
ELD.K12.ELL.SU.1: ELD.K12.ELL.SI.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science. English language learners communicate for social and instructional purposes within the school setting.	
	Evaluate how environment and personal health are interrelated.	
HE.912.C.1.3:	Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.	
	Analyze how heredity and family history can impact personal health.	
HE.912.C.1.7:	Clarifications: Drug use, family obesity, heart disease, mental health, and non-communicable illness or disease.	

GENERAL NOTES

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education	
Course Number: 2000440	Courses > Grade Group: Grades 9 to 12 and Adult	
Course Number: 2000440	Education Courses > Subject: Science > SubSubject:	
	Biological Sciences >	
	Abbreviated Title: GENETICS HON	
Number of Credits: One (1) credit	Course Length: Year (Y)	
	Course Attributes:	
	Honors	
Course Type: Core Academic Course	Course Level: 3	
Course Status: Course Approved		
Grade Level(s): 9,10,11,12		
Graduation Requirement: Equally Rigorous Science		

Educator Certifications

Science (Secondary Grades 7-12)	
Biology (Grades 6-12)	

Genetics Honors (#2000440) 2022 - And Beyond

Name	Description
SC.912.L.15.8:	Describe the scientific explanations of the origin of life on Earth.
SC.912.L.15.9:	Explain the role of reproductive isolation in the process of speciation.
SC 0121 15 12	List the conditions for Hardy-Weinberg equilibrium in a population and why these conditions are not likely to appear in nature. Use the Hardy-
56.712.E.15.12.	Weinberg equation to predict genotypes in a population from observed phenotypes.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.15.14:	Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.16.1:	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.16.3:	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.6:	Discuss the mechanisms for regulation of gene expression in prokarvotes and eukarvotes at transcription and translation level.
SC.912.1.16.7:	Describe how viruses and bacteria transfer genetic material between cells and the role of this process in biotechnology.
SC 912 L 16 8	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer
SC 912 L 16 9	Explain how and why the genetic code is universal and is common to almost all organisms
SC 912 L 16 10	Evaluate the impact of biotechnology on the individual society and the environment including medical and ethical issues
56.712.E.10.10.	Discuss the technologies associated with forensic medicine and DNA identification, including restriction fragment length polymorphism (PELP)
SC.912.L.16.11:	analysis.
SC.912.L.16.12:	transformation) is used to construct recombinant DNA molecules (DNA cloning).
SC.912.L.16.14:	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.
SC.912.L.16.16:	Describe the process of melosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.
SC.912.L.16.17:	Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation.
SC.912.L.17.1:	Discuss the characteristics of populations, such as number of individuals, age structure, density, and pattern of distribution.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of
	invasive, non-native species.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC 912 N 1 2	Describe and explain what characterizes science and its methods
SC 012 N 2 1	Identify what is science, what clearly is not science, and what superficially recombles science (but fails to most the criterio for science)
36.912.IN.Z.T:	Identify what is science, what clearly is not science, and what superindary resemples science (but raits to meet the chientarior Science).
SC.912.N.2.2:	identity which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC 912 N 2 5	Describe the function of models in science, and identify the wide range of models used in science.
SC 012 D 12 12	Evolution of models in second, and identify the wide range of models used in solelide.
JU.712.F.12.12.	

MA.K12.MTR.1.1:	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach. Clarifications: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.

MA.K12.MTR.6.1:	Mathematicians who assess the reasonableness of solutions:
	Estimate to discover possible solutions.
	Use benchmark quantities to determine if a solution makes sense.
	Check calculations when solving problems.
	Verify possible solutions by explaining the methods used.
	Evaluate results based on the given context.
	Clarifications
	Teachers who encourage students to assess the reasonableness of solutions:
	Have students estimate or predict solutions prior to solving.
	 Prompt students to continually ask, "Does this solution make sense? How do you know?"
	Reinforce that students check their work as they progress within and after a task.
	• Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts.
	Mathematicians who apply mathematics to real-world contexts:
	Connect mathematical concents to overview experiences
	Connect mathematical concepts to every subject enclose. Ise models and methods to understand, represent and solve problems.
	 Perform investigations to gather data or determine if a method is appropriate • Redesign models and methods to improve accuracy or
	efficiency.
MA.K12.MTR.7.1:	
	Teachers who encourage students to apply mathematics to real-world contexts:
	 Provide opportunities for students to create models, both concrete and abstract, and perform investigations.
	Challenge students to question the accuracy of their models and methods.
	Support students as they validate conclusions by comparing them to the given situation.
	Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details
	from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.
	2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In
	3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly
	quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide
	referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	0.12 Students continue with providus skills and should be aware of existing style guides and the ways in which they differ
	³ ¹² Students continue with previous skins and should be aware or existing style guides and the ways in which they driver.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications:
	See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
FI Δ K12 FF 3 1·	Clarifications:
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications:
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully.
ELA.K12.EE.3.1: ELA.K12.EE.4.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The
ELA.K12.EE.3.1: ELA.K12.EE.4.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
ELA.K12.EE.3.1: ELA.K12.EE.4.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills.
ELA.K12.EE.3.1: ELA.K12.EE.4.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.3.1: ELA.K12.EE.4.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.3.1: ELA.K12.EE.4.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence. Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.3.1: ELA.K12.EE.4.1: ELA.K12.EE.5.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence. Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they
ELA.K12.EE.3.1: ELA.K12.EE.4.1: ELA.K12.EE.5.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence. Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to
ELA.K12.EE.3.1: ELA.K12.EE.4.1: ELA.K12.EE.5.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence. Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.3.1: ELA.K12.EE.4.1: ELA.K12.EE.5.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence. Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work. Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.3.1: ELA.K12.EE.4.1: ELA.K12.EE.5.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence. Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work. Use appropriate voice and tone when speaking or writing. Clarifications: Clarifications:
ELA.K12.EE.3.1: ELA.K12.EE.4.1: ELA.K12.EE.5.1: ELA.K12.EE.6.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence. Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work. Use appropriate voice and tone when speaking or writing. Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our frie
ELA.K12.EE.3.1: ELA.K12.EE.4.1: ELA.K12.EE.5.1: ELA.K12.EE.6.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence. Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work. Use appropriate voice and tone when speaking or writing. Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our fri
ELA.K12.EE.3.1: ELA.K12.EE.4.1: ELA.K12.EE.5.1: ELA.K12.EE.6.1: ELD.K12.ELL.SC.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence. Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work. Use appropriate voice and tone when speaking or writing. Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our fri
ELA.K12.EE.3.1: ELA.K12.EE.4.1: ELA.K12.EE.5.1: ELA.K12.EE.6.1: ELD.K12.ELL.SC.1: ELD.K12.ELL.SC.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In kindergarten, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students will incorporate skills learned into work products to produce quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work. Clarifications: Use appropriate voice and tone when speaking or writing. Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, s
ELA.K12.EE.3.1: ELA.K12.EE.4.1: ELA.K12.EE.5.1: ELA.K12.EE.6.1: ELD.K12.ELL.SC.1: ELD.K12.ELL.SL.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence. Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work. Use appropriate voice and tone when speaking or writing. Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our fri
ELA.K12.EE.3.1: ELA.K12.EE.4.1: ELA.K12.EE.5.1: ELA.K12.EE.6.1: ELD.K12.ELL.SC.1: ELD.K12.ELL.SL.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation and support claims and counterclaims with evidence. Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work. Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice app

	weather, air, and water conditions.	
	Analyze how heredity and family history can impact personal health.	
HE.912.C.1.7:	Clarifications:	
	Drug use, family obesity, heart disease, mental health, and non-communicable illness or disease.	

GENERAL NOTES

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2000440	Courses > Grade Group: Grades 9 to 12 and Adult
course Number: 2000440	Education Courses > Subject: Science > SubSubject:
	Biological Sciences >
	Abbreviated Title: GENETICS HON
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
Course Type: Core Academic Course	Course Level: 3
Course Status: State Board Approved	
Grade Level(s): 9,10,11,12	

Educator Certifications

Graduation Requirement: Equally Rigorous Science

Science (Secondary Grades 7-12)	
Biology (Grades 6-12)	

Bioscience 1 Honors (#2000500) 2015 - 2022 (current)

Name	Description
SC.912.L.14.1:	Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.
SC.912.L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).
SC.912.L.14.3:	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.16.3:	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.6:	Discuss the mechanisms for regulation of gene expression in prokaryotes and eukaryotes at transcription and translation level.
SC.912.L.16.7:	Describe how viruses and bacteria transfer genetic material between cells and the role of this process in biotechnology.
SC.912.L.16.8:	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.
SC.912.L.16.9:	Explain how and why the genetic code is universal and is common to almost all organisms.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.1.16.12:	Describe how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and
	transformation) is used to construct recombinant DNA molecules (DNA cloning).
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.2:	Describe the important structural characteristics of monosaccharides, disaccharides, and polysaccharides and explain the functions of carbohydrates in living things.
SC.912.L.18.3:	Describe the structures of fatty acids, triglycerides, phospholipids, and steroids. Explain the functions of lipids in living organisms. Identify some reactions that fatty acids undergo. Relate the structure and function of cell membranes.
SC.912.N.1.1:	 Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.

SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena: thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.
SC.912.P.8.12:	Describe the properties of the carbon atom that make the diversity of carbon compounds possible.
SC.912.P.8.13:	Identify selected functional groups and relate how they contribute to properties of carbon compounds.
LAFS.910.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
LAFS.910.RST.1.2:	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.2.5:	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LAFS.910.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.RST.3.8:	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
LAFS.910.RST.3.9:	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
LAFS.910.RST.4.10:	By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.
LAFS.910.SL.1.1:	 a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.910.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.910.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications)

or the significance of the topic).

LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.910.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.910.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
LAFS.910.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or
LAFS.910.WHST.3.8:	broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.910.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
MAFS.912.A-CED.1.4:	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R. ★
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i> \star
MAFS.912.F-IF.3.7:	 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and
	amplitude, and using phase shift.
MAFS.912.F-LE.1.1:	 Distinguish between situations that can be modeled with linear functions and with exponential functions. ★ a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
	c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.2:	Clarifications: Algebra 1 Content Notes: Working with quantities and the relationships between them provides grounding for work with expressions, equations, and functions.
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. *
MAFS.912.S-ID.1.1:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). 🖈
MAFS.912.S-ID.1.3:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.2.6:	 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association.
	Clarifications: Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems.

1	
	using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting
MAFS.K12.MP.2.1:	Reason abstractly and quantitatively. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
MAFS.K12.MP.3.1:	Construct viable arguments and critique the reasoning of others. Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Model with mathematics
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
	Standard Relation to Course: Supporting
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered $7 × 5 + 7 × 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as $2 × 7$ and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

	Standard Relation to Course: Supporting
HE.912.C.1.4:	Propose strategies to reduce or prevent injuries and health problems.
	Clarifications: Mandatory passenger-restraint/helmet laws, refusal skills, mandatory immunizations, healthy relationship skills, and improved inspection of food sources.
	Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases.
HE.912.C.1.5:	Clarifications: Health prevention, detection, and treatment of: breast and testicular cancer, suicide, obesity, and industrial-related chronic disease.
	Assess the degree of susceptibility to injury, illness, or death if engaging in unhealthy/risky behaviors.
HE.912.C.1.8:	Clarifications: Risks associated with alcohol abuse, including poison, date rape, and death; cancer and chronic lung disease related to tobacco use; overdose from drug use; child abuse or neglect; and dating violence.
SS.912.C.2.4:	Evaluate, take, and defend positions on issues that cause the government to balance the interests of individuals with the public good.
	Analyze the impact of citizen participation as a means of achieving political and social change.
SS.912.C.2.8:	Clarifications: Examples are e-mail campaigns, boycotts, blogs, podcasts, protests, demonstrations, letters to editors.
	Analyze various forms of political communication and evaluate for bias, factual accuracy, omission, and emotional appeal.
SS.912.C.2.13:	Clarifications: Examples are political cartoons, propaganda, campaign advertisements, political speeches, electronic bumper stickers, blogs, media.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007). Bioscience I is a laboratory based course that focuses on introducing students to the basic lab techniques, equipment, critical thinking, work ethics, and communication skills currently used in the medical, agricultural, marine and industrial bioscience fields. Students will gain an understanding of basic DNA and molecular biology, epigenetics, penetically modified foods, bacterial plasmids, and forensics. Students will learn the principles, methodologies, and applications of equipment such as thermocyclers, horizontal gel electrophoresis apparatus, micropipettes, spectrophotometers, centrifuges, etc. Students will gain proficiency in calculating, preparing, and pH control of common lab reagents, solutions, buffers, and agarose gels. Students will learn the principles of qualitative and quantitative analysis using biomolecular indicators, spectrophot

Laboratory activities should include but not be limited to:

- Sterilization, handling and safety requirements according to standard operating procedures;
- The preparation of buffer solutions and agarose gels for horizontal electrophoresis;
- The preparation of solutions for spectroscopy;
- Use a spectrophotometer to measure solution concentrations and graph standard curves;
- Bacterial transformation and ligation using the Green fluorescent protein gene;
- Extraction of DNA;
- Quantitative analysis of DNA molecular weights;
- · Polymerase chain reactions using given primers;
- Simulate DNA fingerprinting techniques used in crime scene analysis using given gene sequences.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2000500	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2000300	Education Courses > Subject: Science > SubSubject:
	Biological Sciences >
	Abbreviated Title: BIOSCIENCE 1 HON
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
	Class Size Core Required
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Educator Certifications

Biology (Grades 6-12) Chemistry (Grades 6-12)

Bioscience 1 Honors (#2000500) 2022-2023

Name	Description
SC.912.L.14.1:	Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.
SC 9121 1/ 2.	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and
56.712.E.14.2.	active transport).
SC.912.L.14.3:	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.16.3:	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.6:	Discuss the mechanisms for regulation of gene expression in prokaryotes and eukaryotes at transcription and translation level.
SC.912.L.16.7:	Describe how viruses and bacteria transfer genetic material between cells and the role of this process in biotechnology.
SC.912.L.16.8:	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.
SC.912.L.16.9:	Explain how and why the genetic code is universal and is common to almost all organisms.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC 0121 16 12	Describe how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and
56.712.E.10.12.	transformation) is used to construct recombinant DNA molecules (DNA cloning).
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC 912 L 18 2	Describe the important structural characteristics of monosaccharides, disaccharides, and polysaccharides and explain the functions of
56.712.E.10.2.	carbohydrates in living things.
SC.912.L.18.3:	Describe the structures of fatty acids, triglycerides, phospholipids, and steroids. Explain the functions of lipids in living organisms. Identify some reactions that fatty acids undergo. Relate the structure and function of cell membranes.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:
	1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
	5. Plan investigations, (Design and evaluate a scientific investigation).
SC.912.N.1.1:	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	set-up, calibration, technique, maintenance, and storage).
	7. Pose answers, explanations, or descriptions of events,
	8. Generate explanations that explicate or describe natural phenomena (inferences),
	9. Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.
	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and
SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger,
	leading to its durability.
	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they
SC.912.N.2.5:	make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as
	they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.

SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.
SC.912.P.8.12:	Describe the properties of the carbon atom that make the diversity of carbon compounds possible.
SC.912.P.8.13:	Identify selected functional groups and relate how they contribute to properties of carbon compounds.
MA.K12.MTR.1.1:	 Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach. Clarifications: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	 Denotist are understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	 Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:

MA.K12.MTR.5.1:	 Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts. Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	 Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create guality work.

ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
	Propose strategies to reduce or prevent injuries and health problems.
HE.912.C.1.4:	Clarifications: Mandatory passenger-restraint/helmet laws, refusal skills, mandatory immunizations, healthy relationship skills, and improved inspection of food sources.
	Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases.
HE.912.C.1.5:	Clarifications: Health prevention, detection, and treatment of: breast and testicular cancer, suicide, obesity, and industrial-related chronic disease.
	Assess the degree of susceptibility to injury, illness, or death if engaging in unhealthy/risky behaviors.
HE.912.C.1.8:	Clarifications: Risks associated with alcohol abuse, including poison, date rape, and death; cancer and chronic lung disease related to tobacco use; overdose from drug use; child abuse or neglect; and dating violence.
SS.912.C.2.4:	Evaluate, take, and defend positions on issues that cause the government to balance the interests of individuals with the public good.
	Analyze the impact of citizen participation as a means of achieving political and social change.
SS.912.C.2.8:	Clarifications: Examples are e-mail campaigns, boycotts, blogs, podcasts, protests, demonstrations, letters to editors.
	Analyze various forms of political communication and evaluate for bias, factual accuracy, omission, and emotional appeal.
SS.912.C.2.13:	Clarifications: Examples are political cartoons, propaganda, campaign advertisements, political speeches, electronic bumper stickers, blogs, media.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007). Bioscience I is a laboratory based course that focuses on introducing students to the basic lab techniques, equipment, critical thinking, work ethics, and communication skills currently used in the medical, agricultural, marine and industrial bioscience fields. Students will gain an understanding of basic DNA and molecular biology, epigenetics, genetically modified foods, bacterial plasmids, and forensics. Students will learn the principles, methodologies, and applications of equipment such as thermocyclers, horizontal gel electrophoresis apparatus, micropipettes, spectrophotometers, centrifuges, etc. Students will gain proficiency in calculating, preparing, and pH control of common lab reagents, solutions, buffers, and agarose gels. Students will learn the principles of qualitative and quantitative analysis using biomolecular indicators, spectrophot

Laboratory activities should include but not be limited to:

- Sterilization, handling and safety requirements according to standard operating procedures;
- The preparation of buffer solutions and agarose gels for horizontal electrophoresis;
- The preparation of solutions for spectroscopy;
- Use a spectrophotometer to measure solution concentrations and graph standard curves;
- Bacterial transformation and ligation using the Green fluorescent protein gene;
- Extraction of DNA;
- Quantitative analysis of DNA molecular weights;
- Polymerase chain reactions using given primers;
- Simulate DNA fingerprinting techniques used in crime scene analysis using given gene sequences.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Prerequisite: Honors Biology Corequisite: Honors Chemistry

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Dath, Castien, Cradoo Drok to 10 Edu

GENERAL INFORMATION

	Course Path: Section: Grades Prek to 12 Education
Course Number: 2000500	Courses > Grade Group: Grades 9 to 12 and Adult
course wamber: 2000300	Education Courses > Subject: Science > SubSubject
	Biological Sciences >
	Abbreviated Title: BIOSCIENCE 1 HON
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
	Class Size Core Required
Course Type: Core Academic Course	Course Level: 3
Course Status: State Board Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Educator Certifications

Biology (Grades 6-12)	
Chemistry (Grades 6-12)	

Bioscience 1 Honors (#2000500) 2023 - And Beyond

Name	Description
SC.912.L.14.1:	Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.
SC.912.L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).
SC.912.L.14.3:	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.16.3:	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.6:	Discuss the mechanisms for regulation of gene expression in prokaryotes and eukaryotes at transcription and translation level.
SC.912.L.16.7:	Describe how viruses and bacteria transfer genetic material between cells and the role of this process in biotechnology.
SC.912.L.16.8:	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.
SC.912.L.16.9:	Explain how and why the genetic code is universal and is common to almost all organisms.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.12:	Describe how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and transformation) is used to construct recombinant DNA molecules (DNA cloning).
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
CC 012 L 10 2.	Describe the important structural characteristics of monosaccharides, disaccharides, and polysaccharides and explain the functions of
30.912.L.10.2.	carbohydrates in living things.
SC.912.L.18.3:	Describe the structures of fatty acids, triglycerides, phospholipids, and steroids. Explain the functions of lipids in living organisms. Identify some reactions that fatty acids undergo. Relate the structure and function of cell membranes.
SC.912.N.1.1:	 Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science)
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion
SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.

SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC 012 N 2 2	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those
SC.912.N.3.3:	relationships. Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported
SC.912.N.3.4:	descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	weign the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.
SC.912.P.8.12:	Describe the properties of the carbon atom that make the diversity of carbon compounds possible.
SC.912.P.8.13:	Identify selected functional groups and relate how they contribute to properties of carbon compounds.
MA.K12.MTR.1.1:	 Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach. Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems. Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
MA.K12.MTR.2.1:	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	 Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and connect mathematical concepts.
	Mathematicians who use patterns and structure to help understand and connect mathematical concepts:

MA.K12.MTR.5.1:	 Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts. Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create guality work.

ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
	Propose strategies to reduce or prevent injuries and health problems.
HE.912.C.1.4:	Clarifications: Mandatory passenger-restraint/helmet laws, refusal skills, mandatory immunizations, healthy relationship skills, and improved inspection of food sources.
	Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases.
HE.912.C.1.5:	Clarifications: Health prevention, detection, and treatment of: breast and testicular cancer, suicide, obesity, and industrial-related chronic disease.
	Assess the degree of susceptibility to injury, illness, or death if engaging in unhealthy/risky behaviors.
HE.912.C.1.8:	Clarifications: Risks associated with alcohol abuse, including poison, date rape, and death; cancer and chronic lung disease related to tobacco use; overdose from drug use; child abuse or neglect; and dating violence.
SS.912.CG.2.4:	 Evaluate, take and defend objective, evidence-based positions on issues that cause the government to balance the interests of individuals with the public good. Students will examine situations when individuals' rights have been restricted for the public good (e.g., limits on speech or rationing of goods during wartime, enactment of the Patriot Act). Students will analyze how environmental and financial policies place limitations on citizens and private industry for the public good. Students will explain different services provided by local, state and national governments to citizens to ensure their rights are protected (e.g., social services, law enforcement, defense, emergency response).
SS.912.CG.2.7:	 Analyze the impact of civic engagement as a means of preserving or reforming institutions. Students will identify legal methods that citizens can use to promote social and political change (e.g., voting, peaceful protests, petitioning, demonstrations, contacting government offices). Students will identify historical examples of citizens achieving or preventing political and social change through civic engagement (e.g., the Abolitionist Movement).
SS.912.CG.2.11:	 Evaluate political communication for bias, factual accuracy, omission and emotional appeal. Students will compare the reporting on the same political event or issue from multiple perspectives. Students will identify various forms of propaganda (e.g., plain folks, glittering generalities, testimonial, fear, logical fallacies). Students will discuss the historical impact of political communication on American political process and public opinion. Examples of political communication may include, but are not limited to,?political cartoons, propaganda, campaign advertisements, political speeches, bumper stickers, blogs, press and social media.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007). Bioscience I is a laboratory based course that focuses on introducing students to the basic lab techniques, equipment, critical thinking, work ethics, and communication skills currently used in the medical, agricultural, marine and industrial bioscience fields. Students will gain an understanding of basic DNA and molecular biology, epigenetics, penetically modified foods, bacterial plasmids, and forensics. Students will learn the principles, methodologies, and applications of equipment such as thermocyclers, horizontal gel electrophoresis apparatus, micropipettes, spectrophotometers, centrifuges, etc. Students will gain proficiency in calculating, preparing, and pH control of common lab reagents, solutions, buffers, and agarose gels. Students will learn the principles of qualitative and quantitative analysis using biomolecular indicators, spectrophot

Laboratory activities should include but not be limited to:

- Sterilization, handling and safety requirements according to standard operating procedures;
- The preparation of buffer solutions and agarose gels for horizontal electrophoresis;
- The preparation of solutions for spectroscopy;
- Use a spectrophotometer to measure solution concentrations and graph standard curves;
- Bacterial transformation and ligation using the Green fluorescent protein gene;
- Extraction of DNA;
- Quantitative analysis of DNA molecular weights;

- Polymerase chain reactions using given primers;
- Simulate DNA fingerprinting techniques used in crime scene analysis using given gene sequences.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text
- 5. Providing extensive research and writing opportunities (claims and evidence).

Prerequisite: Honors Biology Corequisite: Honors Chemistry

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2000E00	Courses > Grade Group: Grades 9 to 12 and Adult
course Number: 2000500	Education Courses > Subject: Science > SubSubject:
	Biological Sciences >
	Abbreviated Title: BIOSCIENCE 1 HON
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
	Class Size Core Required
Course Type: Core Academic Course	Course Level: 3
Course Status: Draft - Course Pending Approval	
Grade Level(s): 9,10,11,12	

Graduation Requirement: Equally Rigorous Science

Educator Certifications

Biology (Grades 6-12) Chemistry (Grades 6-12)

Bioscience 2 Honors (#2000510) 2015 - 2022 (current)

Name	Description
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.14.52:	Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.6:	Discuss the mechanisms for regulation of gene expression in prokaryotes and eukaryotes at transcription and translation level.
SC.912.L.16.7:	Describe how viruses and bacteria transfer genetic material between cells and the role of this process in biotechnology.
SC.912.L.16.9:	Explain how and why the genetic code is universal and is common to almost all organisms.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.12:	Describe how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and transformation) is used to construct recombinant DNA molecules (DNA cloning).
SC.912.L.18.4:	Describe the structures of proteins and amino acids. Explain the functions of proteins in living organisms. Identify some reactions that amino acids undergo. Relate the structure and function of enzymes.
SC.912.N.1.1:	 Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.

SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.
LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LAFS.1112.RST.4.10:	By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.
LAFS.1112.SL.1.1:	 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.1112.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.1112.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.1112.WHST.3.8:	Game relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.

LAFS.1112.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences,
MAFS.912.A-CED.1.4:	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law $V = IR$ to highlight resistance R .
	Interpret expressions that represent a quantity in terms of its context.
MAFS.912.A-SSE.1.1:	 a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret p(1+r)ⁿ as the product of P and a factor not depending on P.
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.
	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. \star
MAFS.912.F-IF.3.7:	 a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
	Distinguish between situations that can be modeled with linear functions and with exponential functions. \star a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal
MAFS.912.F-LE.1.1:	intervals. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. \star
	Clarifications:
MAFS.912.N-Q.1.2:	Algebra 1 Content Notes:
	Working with quantities and the relationships between them provides grounding for work with expressions, equations, and functions.
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★
	Represent data with plots on the real number line (dot plots, histograms, and box plots). *
MAFS.912.S-ID.1.1:	In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
MAFS.912.S-ID.1.3:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. \star
	a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models.
	b. Informally assess the fit of a function by plotting and analyzing residuals.
MAFS.912.S-ID.2.6:	c. Fit a linear function for a scatter plot that suggests a linear association.
	Clarifications: Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting
	Reason abstractly and quantitatively.
	ivial nematically proticient students make sense or quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically

MAFS.K12.MP.2.1:	and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting Model with mathematics
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
MAFS.K12.MP.6.1:	Attend to precision. Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting Propose strategies to reduce or prevent injuries and health problems.
HE.912.C.1.4:	Clarifications: Mandatory passenger-restraint/helmet laws, refusal skills, mandatory immunizations, healthy relationship skills, and improved inspection of food sources.

	Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases.		
HE.912.C.1.5:	Clarifications: Health prevention, detection, and treatment of: breast and testicular cancer, suicide, obesity, and industrial-related chronic disease.		
	Assess the degree of susceptibility to injury, illness, or death if engaging in unhealthy/risky behaviors.		
HE.912.C.1.8:	Clarifications: Risks associated with alcohol abuse, including poison, date rape, and death; cancer and chronic lung disease related to tobacco use; overdose from drug use; child abuse or neglect; and dating violence.		
SS.912.C.2.4:	Evaluate, take, and defend positions on issues that cause the government to balance the interests of individuals with the public good.		
SS.912.C.2.8:	Analyze the impact of citizen participation as a means of achieving political and social change.		
	Clarifications: Examples are e-mail campaigns, boycotts, blogs, podcasts, protests, demonstrations, letters to editors.		
	Analyze various forms of political communication and evaluate for bias, factual accuracy, omission, and emotional appeal.		
SS.912.C.2.13:	Clarifications: Examples are political cartoons, propaganda, campaign advertisements, political speeches, electronic bumper stickers, blogs, media.		
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.		
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.		

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007). Bioscience II is a rigorous laboratory based course that provides an advanced foundation in the concepts, theories, and pioneering methods involved in micro and molecular based research including medical research, functional genomics, gene discovery, agriculture and forensics. Students will learn how to design plasmids and primers for polymerase chain reactions (PCR). Course focus will be on proteomics (the study of protein expression), protein separation and analysis, protein chromatography purification, protein quantification through spectroscopy, cladistical analysis, immunology, stem cell research, gene sequencing, and bioinformatics using BLAST (Basic Local Alignment Search Tool.) Emphasis will be placed on training students in the means by which to design experiments in preparation for independent research. Students will learn the principles, m

Laboratory activities may include but not be limited to:

- The preparation of buffer solutions and polyacrylamide gels for vertical electrophoresis;
- Quantitative analysis of protein molecular weights by developing a standard curve;
- Western blotting and ELISA testing;
- The preparation of serial dilutions for spectroscopy to determine unknown concentrations;
- Bacterial transformation and ligation using bacterial blue/white screening;
- Extraction of DNA for chromatography purification to be used for electrophoresis;
- · Polymerase chain reactions using self designed primers;
- Gene Sequencing and Bioinformatics.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes

Instructional Practices: Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Prerequisite: Honors Chemistry and Bioscience I/or AP Biology Corequisite: Honors Physics

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.

- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2000E10	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2000310	Education Courses > Subject: Science > SubSubject:
	Biological Sciences >
	Abbreviated Title: BIOSCIENCE 2 HON
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	

Educator Certifications

Graduation Requirement: Equally Rigorous Science

Biology (Grades 6-12)		
Chemistry (Grades 6-12)		

Bioscience 2 Honors (#2000510) 2022 - 2023

Name	Description
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.14.52:	Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.6:	Discuss the mechanisms for regulation of gene expression in prokaryotes and eukaryotes at transcription and translation level.
SC.912.L.16.7:	Describe how viruses and bacteria transfer genetic material between cells and the role of this process in biotechnology.
SC.912.L.16.9:	Explain how and why the genetic code is universal and is common to almost all organisms.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.12:	Describe how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and transformation) is used to construct recombinant DNA molecules (DNA cloning).
SC.912.L.18.4:	Describe the structures of proteins and amino acids. Explain the functions of proteins in living organisms. Identify some reactions that amino acids undergo. Relate the structure and function of enzymes.
SC.912.N.1.1:	 Denne a problem based on a specific body of knowledge, for example, bloggy, chemistry, physics, and ear mispace science, and do the following. Pose questions about the natural world, (Articulate the purpose of the investigation and identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods. Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on, critical and logical
SC.912.N.1.3:	thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.

SC.912.P.8.11: MA.K12.MTR.1.1:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH. Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach. Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' effort when solving challenging problems.
MA.K12.MTR.2.1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts. Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.

	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
	Estimate to discover possible solutions
	 Use benchmark quantities to determine if a solution makes sense.
	Check calculations when solving problems.
	Verify possible solutions by explaining the methods used.
MA.K12.MTR.6.1:	Evaluate results based on the given context.
	Clarifications:
	Teachers who encourage students to assess the reasonableness of solutions:
	Have students estimate or predict solutions prior to solving.
	Reinforce that students check their work as they progress within and after a task
	 Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts.
	Mathematicians who apply mathematics to real-world contexts:
	Connect mathematical concepts to everyday experiences.
	 Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate + Pedesign models and methods to improve accuracy or
	efficiency.
MA.K12.MTR.7.1:	Clarifications:
	Teachers who encourage students to apply mathematics to real-world contexts:
	Provide opportunities for students to create models, both concrete and abstract, and perform investigations.
	Challenge students to question the accuracy of their models and methods.
	 Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Cite evidence to evaluate and justify reaconing
	K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details
	from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.
	2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In
ELA K12 EE 1 1.	3rd grade, students should use a combination of direct and indirect citations.
LLA.R12.LL.1.1.	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly
	referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications:
	See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA K12 EE 3 1.	Clarifications: Students will make inferences before the words inferior inference are introduced. Kindergarten students will answer questions like "Why is the
	girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and
	beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
	In kindergarten, students learn to listen to one another respectfully.
	In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The
LLA.N12.LL.4.1.	collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills.
	Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work.
	Clarifications:
	Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they
	do guality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications:
	In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts
	Propose strategies to reduce or prevent injuries and health problems.
	Clarifications:
HE.912.C.1.4:	Mandatory passenger-restraint/helmet laws, refusal skills, mandatory immunizations, healthy relationship skills, and improved inspection of food
	sources.

	Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases.
HE.912.C.1.5:	Clarifications: Health prevention, detection, and treatment of: breast and testicular cancer, suicide, obesity, and industrial-related chronic disease.
HE.912.C.1.8:	Assess the degree of susceptibility to injury, illness, or death if engaging in unhealthy/risky behaviors.
	Clarifications: Risks associated with alcohol abuse, including poison, date rape, and death; cancer and chronic lung disease related to tobacco use; overdose from drug use; child abuse or neglect; and dating violence.
SS.912.C.2.4:	Evaluate, take, and defend positions on issues that cause the government to balance the interests of individuals with the public good.
SS.912.C.2.8:	Analyze the impact of citizen participation as a means of achieving political and social change.
	Clarifications: Examples are e-mail campaigns, boycotts, blogs, podcasts, protests, demonstrations, letters to editors.
SS.912.C.2.13:	Analyze various forms of political communication and evaluate for bias, factual accuracy, omission, and emotional appeal.
	Clarifications: Examples are political cartoons, propaganda, campaign advertisements, political speeches, electronic bumper stickers, blogs, media.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007). Bioscience II is a rigorous laboratory based course that provides an advanced foundation in the concepts, theories, and pioneering methods involved in micro and molecular based research including medical research, functional genomics, gene discovery, agriculture and forensics. Students will learn how to design plasmids and primers for polymerase chain reactions (PCR). Course focus will be on proteomics (the study of protein expression), protein separation and analysis, protein chromatography purification, protein quantification through spectroscopy, cladistical analysis, immunology, stem cell research, gene sequencing, and bioinformatics using BLAST (Basic Local Alignment Search Tool.) Emphasis will be placed on training students in the means by which to design experiments in preparation for independent research. Students will learn the principles, m

Laboratory activities may include but not be limited to:

- The preparation of buffer solutions and polyacrylamide gels for vertical electrophoresis;
- Quantitative analysis of protein molecular weights by developing a standard curve;
- Western blotting and ELISA testing;
- The preparation of serial dilutions for spectroscopy to determine unknown concentrations;
- Bacterial transformation and ligation using bacterial blue/white screening;
- Extraction of DNA for chromatography purification to be used for electrophoresis;
- Polymerase chain reactions using self designed primers;
- Gene Sequencing and Bioinformatics.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes

Instructional Practices: Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Prerequisite: Honors Chemistry and Bioscience I/or AP Biology

Corequisite: Honors Physics

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.

- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Course Bath: Section: Crades Brok to 12 Education

GENERAL INFORMATION

	Course Fatth. Section. Grades Trek to 12 Education
Course Number: 2000510	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2000510	Education Courses > Subject: Science > SubSubject:
	Biological Sciences >
	Abbreviated Title: BIOSCIENCE 2 HON
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
Course Type: Core Academic Course	Course Level: 3
Course Status: State Board Approved	
Grade Level(s): 9,10,11,12	

Educator Certifications

Graduation Requirement: Equally Rigorous Science

Biology (Grades 6-12)	
Chemistry (Grades 6-12)	

Bioscience 2 Honors (#2000510) 2023 - And Beyond

Name	Description
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.14.52:	Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic change in offspring
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.6:	Discuss the mechanisms for regulation of gene expression in prokaryotes and eukaryotes at transcription and translation level.
SC.912.L.16.7:	Describe how viruses and bacteria transfer genetic material between cells and the role of this process in biotechnology.
SC.912.L.16.9:	Explain how and why the genetic code is universal and is common to almost all organisms.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.12:	Describe how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and transformation) is used to construct recombinant DNA molecules (DNA cloning).
SC.912.L.18.4:	Describe the structures of proteins and amino acids. Explain the functions of proteins in living organisms. Identify some reactions that amino acids undergo. Relate the structure and function of enzymes.
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.

SC.912.P.8.11: MA.K12.MTR.1.1:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH. Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach. Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts. Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
-----------------	---
	Fotimento to diagover regolible solutions
	 Estimate to discover possible solutions. Use henchmark quantities to determine if a solution makes sense.
	Check calculations when solving problems
	 Verify possible solutions by explaining the methods used.
	Evaluate results based on the given context.
	Clarifications:
	Teachers who encourage students to assess the reasonableness of solutions:
	Have students estimate or predict solutions prior to solving.
	 Prompt students to continually ask, Does this solution make sense? How do you know? Reinforce that students check their work as they progress within and after a task.
	 Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts.
	Mathematicians who apply mathematics to real-world contexts:
	Connect mathematical concepts to everyday experiences.
	Use models and methods to understand, represent and solve problems.
	 Perform investigations to gather data or determine if a method is appropriate. Redesign models and methods to improve accuracy or
MA.K12.MTR.7.1:	
	Teachers who encourage students to apply mathematics to real-world contexts:
	 Provide opportunities for students to create models, both concrete and abstract, and perform investigations.
	Challenge students to question the accuracy of their models and methods.
	Support students as they validate conclusions by comparing them to the given situation.
	Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details
	from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.
	2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In
	3rd grade, students should use a combination of direct and indirect citations.
ELA.KIZ.EE.I.I:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly
	quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently
ELA.K12.EE.2.1:	Clarifications:
	See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
	Clarifications:
ELA.K12.EE.3.1:	Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the
	beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
	Clarifications:
	In kindergarten, students learn to listen to one another respectfully.
ELA.K12.EE.4.1:	In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work
ELA.K12.EE.5.1:	Clarifications:
	Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they
	must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to
	do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing.
	Clarifications:
	differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
	Propose strategies to reduce or prevent injuries and health problems.
HE.912.C.1.4:	Clarifications:
	Mandatory passenger-restraint/helmet laws, refusal skills, mandatory immunizations, healthy relationship skills, and improved inspection of food

	Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases.
HE.912.C.1.5:	Clarifications: Health prevention, detection, and treatment of: breast and testicular cancer, suicide, obesity, and industrial-related chronic disease.
	Assess the degree of susceptibility to injury, illness, or death if engaging in unhealthy/risky behaviors.
HE.912.C.1.8:	Clarifications: Risks associated with alcohol abuse, including poison, date rape, and death; cancer and chronic lung disease related to tobacco use; overdose from drug use; child abuse or neglect; and dating violence.
SS.912.CG.2.4:	 Evaluate, take and defend objective, evidence-based positions on issues that cause the government to balance the interests of individuals with the public good. Students will examine situations when individuals' rights have been restricted for the public good (e.g., limits on speech or rationing of goods during wartime, enactment of the Patriot Act). Students will analyze how environmental and financial policies place limitations on citizens and private industry for the public good. Students will explain different services provided by local, state and national governments to citizens to ensure their rights are protected (e.g., social services, law enforcement, defense, emergency response).
SS.912.CG.2.7:	 Analyze the impact of civic engagement as a means of preserving or reforming institutions. Students will identify legal methods that citizens can use to promote social and political change (e.g., voting, peaceful protests, petitioning, demonstrations, contacting government offices). Students will identify historical examples of citizens achieving or preventing political and social change through civic engagement (e.g., the Abolitionist Movement).
SS.912.CG.2.11:	 Evaluate political communication for bias, factual accuracy, omission and emotional appeal. Students will compare the reporting on the same political event or issue from multiple perspectives. Students will identify various forms of propaganda (e.g., plain folks, glittering generalities, testimonial, fear, logical fallacies). Students will discuss the historical impact of political communication on American political process and public opinion. Examples of political communication may include, but are not limited to,?political cartoons, propaganda, campaign advertisements, political speeches, bumper stickers, blogs, press and social media.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007). Bioscience II is a rigorous laboratory based course that provides an advanced foundation in the concepts, theories, and pioneering methods involved in micro and molecular based research including medical research, functional genomics, gene discovery, agriculture and forensics. Students will learn how to design plasmids and primers for polymerase chain reactions (PCR). Course focus will be on proteomics (the study of protein expression), protein separation and analysis, protein chromatography purification, protein quantification through spectroscopy, cladistical analysis, immunology, stem cell research, gene sequencing, and bioinformatics using BLAST (Basic Local Alignment Search Tool.) Emphasis will be placed on training students in the means by which to design experiments in preparation for independent research. Students will learn the principles, m

Laboratory activities may include but not be limited to:

- The preparation of buffer solutions and polyacrylamide gels for vertical electrophoresis;
- Quantitative analysis of protein molecular weights by developing a standard curve;
- Western blotting and ELISA testing;
- The preparation of serial dilutions for spectroscopy to determine unknown concentrations;
- Bacterial transformation and ligation using bacterial blue/white screening;
- Extraction of DNA for chromatography purification to be used for electrophoresis;
- Polymerase chain reactions using self designed primers;
- Gene Sequencing and Bioinformatics.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes

Instructional Practices: Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.

- 4. Emphasizing students supporting answers based upon evidence from the text.
- $\ensuremath{\mathsf{5.}}$ Providing extensive research and writing opportunities (claims and evidence).

Prerequisite: Honors Chemistry and Bioscience I/or AP Biology Corequisite: Honors Physics

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION	
Course Number: 2000510	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Biological Sciences >
	Abbreviated Title: BIOSCIENCE 2 HON
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
Course Type: Core Academic Course	Course Level: 3
Course Status: Draft - Course Pending Approval	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Educator Certifications

Biology (Grades 6-12) Chemistry (Grades 6-12)

Bioscience 3 Honors (#2000520) 2015 - 2022 (current)

Name	Description
LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text: summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LAFS.1112.RST.4.10:	By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.
LAFS.1112.SL.1.1:	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.1112.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.1112.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.1112.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.1112.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
SC.912.L.16.11:	Discuss the technologies associated with forensic medicine and DNA identification, including restriction fragment length polymorphism (RFLP) analysis.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others,
	 Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1: SC.912.N.2.2:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science). Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as
SC 012 N 2 2	questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.8.11: SC.912.P 12 12	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH. Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction
MAFS.912.A-CED.1.4:	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to
	nigniight resistance R. ★ Interpret expressions that represent a quantity in terms of its context. ★
	a. Interpret parts of an expression, such as terms, factors, and coefficients.
MAFS.912.A-SSE.1.1:	b. Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret P(1+r) ⁿ as the product of P and a factor not depending on P.

	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★	
MAFS.912.F-IF.3.7:	 a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift. 	
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★	
MAFS.912.N-Q.1.2:	Define appropriate quantities for the purpose of descriptive modeling. ★ Clarifications: Algebra 1 Content Notes: Working with quantities and the relationships between them provides grounding for work with expressions, equations, and functions.	
	Chaosa a level of accuracy appropriate to limitations on measurement when reporting quantities.	
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star	
MARS 912 S-IC 2 5	Use data from a randomized experiment to compare two treatments: use simulations to decide if differences between parameters are significant.	
MAFS.912.S-ID.2.6:	 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association. 	
	Clarifications: Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.	
MAFS.912.S-ID.3.8:	Compute (using technology) and interpret the correlation coefficient of a linear fit. ★ Make sense of problems and persevere in solving them.	
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.	
	Standard Relation to Course: Supporting	
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.	
	Construct viable arguments and critique the reasoning of others.	
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.	
	Standard Relation to Course: Supporting Model with mathematics.	
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs,	

	flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting
MAFS.K12.MP.5.1:	Use appropriate tools strategically. Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
MAFS.K12.MP.6.1:	Attend to precision. Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions. Standard Palation to Course: Supporting
	Look for and make use of structure
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
SS 912 C 2 A	Standard Relation to Course: Supporting Evaluate take and defend positions on issues that cause the government to balance the interests of individuals with the public good
33.912.0.2.4.	Conduct a service project to further the public good.
SS.912.C.2.5:	Clarifications: Examples are school, community, state, national, international.
	Analyze the impact of citizen participation as a means of achieving political and social change.
SS.912.C.2.8:	Clarifications: Examples are e-mail campaigns, boycotts, blogs, podcasts, protests, demonstrations, letters to editors.
SS.912.C.2.10:	Clarifications: Examples are On-line Sunshine, media, e-mails to government officials, political text messaging.
SS.912.C.2.13:	Analyze various forms of political communication and evaluate for bias, factual accuracy, omission, and emotional appeal. Clarifications: Examples are political cartoons, propaganda, campaign advertisements, political speeches, electronic bumper stickers, blogs, media.
	Evaluate how environment and personal health are interrelated.
HE.912.C.1.3:	Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
	Propose strategies to reduce or prevent injuries and health problems.
HE.912.C.1.4:	Clarifications: Mandatory passenger-restraint/helmet laws, refusal skills, mandatory immunizations, healthy relationship skills, and improved inspection of food sources.
	Assess the degree of susceptibility to injury, illness, or death if engaging in unhealthy/risky behaviors.
HE.912.C.1.8:	Clarifications: Risks associated with alcohol abuse, including poison, date rape, and death; cancer and chronic lung disease related to tobacco use; overdose from drug use; child abuse or neglect; and dating violence.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007). Bioscience III is an advanced laboratory based research course that will apply the conceptual knowledge and practical skills learned in Bioscience I and II. The goal of this course is to develop skills in the evaluation of research, to provide practice in scientific writing, to develop oral communication skills, and to expose students to current literature and research in the field of Bioscience. The first part of the course will focus on the analysis, evaluation, and discussion of recent Bioscience-related research publications. Students will be required to provide both oral and written evaluations of the publications that are discussed. Students will form teams and work with faculty to design and implement an independent research project, prepare a technical paper, and present their results. Students will be given the option to participate in local

Independent laboratory activities should emphasize experimental design of an original research project and may include but should not be limited to:

- Determine and implement specific electrophoresis techniques;
- Primer Design specified by the parameters of the research project;
- Plasmid Design;
- Extraction and purification of DNA and/or protein.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis: Ensuring wide reading from complex text that varies in length.

- 1. Making close reading and rereading of texts central to lessons.
- 2. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 3. Emphasizing students supporting answers based upon evidence from the text.
- 4. Providing extensive research and writing opportunities (claims and evidence).
- 5. Integration of Florida Standards for Mathematical Practice.

Pre-requisites: Bioscience II Corequisite: Equally rigorous science course

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Number of Credits: One (1) credit

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Educator Certifications

Biology (Grades 6-12) Chemistry (Grades 6-12) Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Biological Sciences > Abbreviated Title: BIOSCIENCE 3 HON Course Length: Year (Y) Course Attributes: • Honors Course Level: 3

Bioscience 3 Honors (#2000520) 2022-2023

Name	Description
SC.912.L.16.11:	Discuss the technologies associated with forensic medicine and DNA identification, including restriction fragment length polymorphism (RFLP) analysis.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of empirical evidence provide and be and light of empirical evidence due to the specific provide and provide and the specific provide and provide and the specific provide
SC.912.N.1.1:	 5. Plan investigations, (Design and evaluate a scientific investigation). 6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage).
	 Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.
SC.912.P.12.12:	 Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction. Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach.
MA.K12.MTR.1.1:	Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others:

	 Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose.
	Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications:

	 Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
	Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
SS.912.C.2.4:	Evaluate, take, and defend positions on issues that cause the government to balance the interests of individuals with the public good.
SS.912.C.2.5:	Conduct a service project to further the public good. Clarifications: Examples are school, community, state, national, international.
	Analyze the impact of citizen participation as a means of achieving political and social change.
SS.912.C.2.8:	Clarifications: Examples are e-mail campaigns, boycotts, blogs, podcasts, protests, demonstrations, letters to editors.
	Monitor current public issues in Florida.
SS.912.C.2.10:	Clarifications: Examples are On-line Sunshine, media, e-mails to government officials, political text messaging.
1	Analyze various forms of political communication and evaluate for bias, factual accuracy, omission, and emotional appeal.

SS.912.C.2.13:	Clarifications: Examples are political cartoons, propaganda, campaign advertisements, political speeches, electronic bumper stickers, blogs, media.
HE.912.C.1.3:	Evaluate how environment and personal health are interrelated. Clarifications:
	Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
	Propose strategies to reduce or prevent injuries and health problems.
HE.912.C.1.4:	Clarifications: Mandatory passenger-restraint/helmet laws, refusal skills, mandatory immunizations, healthy relationship skills, and improved inspection of food sources.
HE.912.C.1.8:	Assess the degree of susceptibility to injury, illness, or death if engaging in unhealthy/risky behaviors.
	Clarifications: Risks associated with alcohol abuse, including poison, date rape, and death; cancer and chronic lung disease related to tobacco use; overdose from drug use; child abuse or neglect; and dating violence.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007). Bioscience III is an advanced laboratory based research course that will apply the conceptual knowledge and practical skills learned in Bioscience I and II. The goal of this course is to develop skills in the evaluation of research, to provide practice in scientific writing, to develop oral communication skills, and to expose students to current literature and research in the field of Bioscience. The first part of the course will focus on the analysis, evaluation, and discussion of recent Bioscience-related research publications. Students will be required to provide both oral and written evaluations of the publications that are discussed. Students will form teams and work with faculty to design and implement an independent research project, prepare a technical paper, and present their results. Students will be given the option to participate in local

Independent laboratory activities should emphasize experimental design of an original research project and may include but should not be limited to:

- Determine and implement specific electrophoresis techniques;
- Primer Design specified by the parameters of the research project;
- Plasmid Design;
- Extraction and purification of DNA and/or protein.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis: Ensuring wide reading from complex text that varies in length.

- 1. Making close reading and rereading of texts central to lessons.
- 2. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 3. Emphasizing students supporting answers based upon evidence from the text.
- 4. Providing extensive research and writing opportunities (claims and evidence).
- 5. Integration of Florida Standards for Mathematical Practice.

Pre-requisites: Bioscience II Corequisite: Equally rigorous science course

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.

• Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION	
Course Number: 2000520	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject Biological Sciences >
	Abbreviated Title: BIOSCIENCE 3 HON
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
Course Type: Core Academic Course	Course Level: 3
Course Status: State Board Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Educator Certifications

Biology (Grades 6-12) Chemistry (Grades 6-12)

Bioscience 3 Honors (#2000520) 2023 - And Beyond

Name	Description
SC.912.L.16.11:	Discuss the technologies associated with forensic medicine and DNA identification, including restriction fragment length polymorphism (RFLP) analysis.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models).
SC.912.N.1.1:	 5. Plan investigations, (Design and evaluate a scientific investigation). 6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). 7. Pose answers, explanations, or descriptions of events,
	 8. Generate explanations that explicate or describe natural phenomena (inferences), 9. Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	identity which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.
SC.912.P.12.12:	 Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction. Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach.
MA.K12.MTR.1.1:	Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others:

	 Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose.
	Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications:

	 Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
	Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	 Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
SS.912.CG.2.3:	 Explain the responsibilities of citizens at the local, state and national levels. Students will identify various responsibilities held by citizens (e.g., voting, volunteering and being informed, respecting laws). Students will understand the process of registering or preregistering to vote and how to complete a ballot in Florida (e.g., uniform primary and general election ballot). Students will discuss appropriate methods of communication with public officials (e.g., corresponding, attending public meetings, requesting a meeting and providing information). Students will participate in classroom activities that simulate exercising the responsibilities of citizenship.
	Evaluate, take and defend objective, evidence-based positions on issues that cause the government to balance the interests of individuals with the
SS.912.CG.2.4:	 public good. Students will examine situations when individuals' rights have been restricted for the public good (e.g., limits on speech or rationing of goods)
	during wartime, enactment of the Patriot Act).

	social services, law enforcement, defense, emergency response).
SS.912.CG.2.7:	 Analyze the impact of civic engagement as a means of preserving or reforming institutions. Students will identify legal methods that citizens can use to promote social and political change (e.g., voting, peaceful protests, petitioning, demonstrations, contacting government offices). Students will identify historical examples of citizens achieving or preventing political and social change through civic engagement (e.g., the Abolitionist Movement).
SS.912.CG.2.11:	 Evaluate political communication for bias, factual accuracy, omission and emotional appeal. Students will compare the reporting on the same political event or issue from multiple perspectives. Students will identify various forms of propaganda (e.g., plain folks, glittering generalities, testimonial, fear, logical fallacies). Students will discuss the historical impact of political communication on American political process and public opinion. Examples of political communication may include, but are not limited to,?political cartoons, propaganda, campaign advertisements, political speeches, bumper stickers, blogs, press and social media.
SS.912.CG.2.12:	 Explain how interest groups, the media and public opinion influence local, state and national decision-making related to public issues. Students will objectively discuss current public issues in Florida and use both the U.S. and Florida Constitutions to justify pro and con positions. Students will examine the relationship and responsibilities of both the state and national governments regarding these public issues. Students will analyze public policy solutions related to local, state and national issues.
HE.912.C.1.3:	Evaluate how environment and personal health are interrelated. Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
HE.912.C.1.4:	Propose strategies to reduce or prevent injuries and health problems. Clarifications: Mandatory passenger-restraint/helmet laws, refusal skills, mandatory immunizations, healthy relationship skills, and improved inspection of food sources.
HE.912.C.1.8:	Assess the degree of susceptibility to injury, illness, or death if engaging in unhealthy/risky behaviors. Clarifications: Risks associated with alcohol abuse, including poison, date rape, and death; cancer and chronic lung disease related to tobacco use; overdose from drug use; child abuse or neglect; and dating violence.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007). Bioscience III is an advanced laboratory based research course that will apply the conceptual knowledge and practical skills learned in Bioscience I and II. The goal of this course is to develop skills in the evaluation of research, to provide practice in scientific writing, to develop oral communication skills, and to expose students to current literature and research in the field of Bioscience. The first part of the course will focus on the analysis, evaluation, and discussion of recent Bioscience-related research publications. Students will be required to provide both oral and written evaluations of the publications that are discussed. Students will form teams and work with faculty to design and implement an independent research project, prepare a technical paper, and present their results. Students will be given the option to participate in local

Independent laboratory activities should emphasize experimental design of an original research project and may include but should not be limited to:

- Determine and implement specific electrophoresis techniques;
- Primer Design specified by the parameters of the research project;
- Plasmid Design;
- Extraction and purification of DNA and/or protein.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis: Ensuring wide reading from complex text that varies in length.

- 1. Making close reading and rereading of texts central to lessons.
- 2. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.

- 3. Emphasizing students supporting answers based upon evidence from the text.
- 4. Providing extensive research and writing opportunities (claims and evidence).
- 5. Integration of Florida Standards for Mathematical Practice.

Pre-requisites: Bioscience II

Corequisite: Equally rigorous science course

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2000520	Courses > Grade Group: Grades 9 to 12 and Adult
course wamber: 2000320	Education Courses > Subject: Science > SubSubject:
	Biological Sciences >
	Abbreviated Title: BIOSCIENCE 3 HON
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
Course Type: Core Academic Course	Course Level: 3
Course Status: Draft - Course Pending Approval	
Grade Level(s): 9,10,11,12	
Graduation Pequirement: Equally Pigorous Science	

Educator Certifications

Biology (Grades 6-12) Chemistry (Grades 6-12)

Florida's Preinternational Baccalaureate Biology 1 (#2000800) 2015 - 2022 (current)

Name	Description
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
SC.912.L.14.1:	Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.
SC.912.L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).
SC.912.L.14.3:	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.
SC.912.L.14.4:	Compare and contrast structure and function of various types of microscopes.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.14.7:	Relate the structure of each of the major plant organs and tissues to physiological processes.
SC.912.L.14.26:	Identify the major parts of the brain on diagrams or models.
SC.912.L.14.36:	Describe the factors affecting blood flow through the cardiovascular system.
SC.912.L.14.52:	Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.
SC.912.L.15.4:	Describe how and why organisms are hierarchically classified and based on evolutionary relationships.
SC.912.L.15.5:	Explain the reasons for changes in how organisms are classified.
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
SC.912.L.15.8:	Describe the scientific explanations of the origin of life on Earth.
SC.912.L.15.10:	Identify basic trends in hominid evolution from early ancestors six million years ago to modern humans, including brain size, jaw size, language, and manufacture of tools.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.15.14:	Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.16.1:	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.16.3:	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.8:	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.
SC.912.L.16.9:	Explain how and why the genetic code is universal and is common to almost all organisms.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.13:	Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.
SC.912.L.16.14:	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.
SC.912.L.16.16:	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.
SC.912.L.16.17:	Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation.
SC.912.L.17.2:	Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.5:	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.

SC.912.L.18.10:	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations of describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
LAFS.910.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
LAFS.910.RST.1.2:	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.2.5:	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LAFS.910.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.RST.3.8:	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
LAFS.910.RST.3.9:	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
LAFS.910.RST.4.10:	By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.
LAFS.910.SL.1.1:	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

LAFS.910.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.910.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.910.WHST.2.5:	significant for a specific purpose and audience.
LAFS.910.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
LAFS.910.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.910.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.910.WHST.4.10:	write routinely over extended time trames (time for reflection and revision) and shorter time trames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
MAFS.912.N-Q.1.1:	choose and interpret the scale and the origin in graphs and data displays. \star
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting Reason abstractly and guantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others.
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting

	Model with mathematics.
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting
MAFS.K12.MP.5.1:	Use appropriate tools strategically. Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
LLU.N IZ.ELL.ƏI. I:	Evaluate how environment and personal health are interrelated.
HE.912.C.1.3:	Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
	Assess the degree of susceptibility to injury, illness, or death if engaging in unhealthy/risky behaviors.
HE.912.C.1.8:	Clarifications: Risks associated with alcohol abuse, including poison, date rape, and death; cancer and chronic lung disease related to tobacco use; overdose from drug use; child abuse or neglect; and dating violence.
	Analyze how heredity and family history can impact personal health.
HE.912.C.1.4 (Archived Standard):	Clarifications: Some examples may include drug use, family obesity, heart disease, mental health, and non-communicable illness or disease.

Special Note. Pre-IB courses have been created by individual schools or school districts since before the MYP started. These courses mapped backwards the Diploma Programme (DP) to prepare students as early as age 14. The IB was never involved in creating or approving these courses. The IB acknowledges that it is important for students to receive preparation for taking part in the DP, and that preparation is the MYP. The IB designed the MYP to address the whole child, which, as a result, has a very different philosophical approach that aims at educating all students aged 11-16. Pre-IB courses usually deal with content, with less emphasis upon the needs of the whole child or the affective domain than the MYP. A school can have a course that it calls "pre-IB" as long as it makes it clear that the course and any supporting material have been developed independently of the IB. For this reason, the school must name the course along the lines of, for example, the "Any School pre-IB course".

The IB does not recognize pre-IB courses or courses labeled IB by different school districts which are not an official part of the IBDP or IBCC curriculum. Typically, students enrolled in grade 9 or 10 are not in the IBDP or IBCC programmes.

https://ibanswers.ibo.org/app/answers/detail/a_id/5414/kw/pre-ib. Florida's Pre-IB courses should only be used in schools where MYP is not offered in order to prepare students to enter the IBDP. Teachers of Florida's Pre-IB courses should have undergone IB training in order to ensure seamless articulation for students within the subject area.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level gualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:

https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/si.pdf

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education	
Course Number: 2000800	Courses > Grade Group: Grades 9 to 12 and Adult	
Course Number: 2000800	Education Courses > Subject: Science > SubSubject:	
	Biological Sciences >	
	Abbreviated Title: FL PRE-IB BIO 1	
Number of Credits: One (1) credit	Course Length: Year (Y)	
	Course Attributes:	
	Honors	
Course Type: Core Academic Course	Course Level: 3	
Course Status: Course Approved		
Grade Level(s): 9,10		
Graduation Requirement: Biology		

Educator Certifications

Science (Secondary Grades 7-12)	
Biology (Grades 6-12)	

Equivalent Courses

2000310-Biology 1

Florida's Preinternational Baccalaureate Biology 1 (#2000800) 2022 - And Beyond

Name	Description
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
SC.912.L.14.1:	Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.
SC.912.L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).
SC.912.L.14.3:	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.
SC.912.L.14.4:	Compare and contrast structure and function of various types of microscopes.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.14.7:	Relate the structure of each of the major plant organs and tissues to physiological processes.
SC.912.L.14.26:	Identify the major parts of the brain on diagrams or models.
SC.912.L.14.36:	Describe the factors affecting blood flow through the cardiovascular system.
SC.912.L.14.52:	Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.
SC.912.L.15.4:	Describe how and why organisms are hierarchically classified and based on evolutionary relationships.
SC.912.L.15.5:	Explain the reasons for changes in how organisms are classified.
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
SC.912.L.15.8:	Describe the scientific explanations of the origin of life on Earth.
SC.912.L.15.10:	Identify basic trends in hominid evolution from early ancestors six million years ago to modern humans, including brain size, jaw size, language, and manufacture of tools.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.15.14:	Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.16.1:	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.16.3:	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.8:	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.
SC.912.L.16.9:	Explain how and why the genetic code is universal and is common to almost all organisms.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.13:	Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.
SC.912.L.16.14:	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.
SC.912.L.16.16:	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.
SC.912.L.16.17:	Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation.
SC.912.L.17.2:	Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.5:	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.

SC.912.L.18.10:	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships betwee test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
MA.K12.MTR.1.1:	 Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach. Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations.
	Clarifications: Teachers who encourage students to complete tasks with mathematical fluency:

	 Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
MA.K12.MTR.4.1:	 Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence.
	Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
MA.K12.MTR.5.1:	 Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations.
	 Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context.
	 Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
MA.K12.MTR.7.1:	Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
FI A K12 FF 1 1-	K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
CONTENEST.T.	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.

	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills.
	Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
	Evaluate how environment and personal health are interrelated.
HE.912.C.1.3:	Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
	Propose strategies to reduce or prevent injuries and health problems.
HE.912.C.1.4:	Clarifications: Mandatory passenger-restraint/helmet laws, refusal skills, mandatory immunizations, healthy relationship skills, and improved inspection of food sources.
	Assess the degree of susceptibility to injury, illness, or death if engaging in unhealthy/risky behaviors.
HE.912.C.1.8:	Clarifications: Risks associated with alcohol abuse, including poison, date rape, and death; cancer and chronic lung disease related to tobacco use; overdose from drug use; child abuse or neglect; and dating violence.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Special Note. Pre-IB courses have been created by individual schools or school districts since before the MYP started. These courses mapped backwards the Diploma Programme (DP) to prepare students as early as age 14. The IB was never involved in creating or approving these courses. The IB acknowledges that it is important for students to receive preparation for taking part in the DP, and that preparation is the MYP. The IB designed the MYP to address the whole child, which, as a result, has a very different philosophical approach that aims at educating all students aged 11-16. Pre-IB courses usually deal with content, with less emphasis upon the needs of the whole child or the affective domain than the MYP. A school can have a course that it calls "pre-IB" as long as it makes it clear that the course and any supporting material have been developed independently of the IB. For this reason, the school must name the course along the lines of, for example, the "Any School pre-IB course".

The IB does not recognize pre-IB courses or courses labeled IB by different school districts which are not an official part of the IBDP or IBCC curriculum. Typically, students enrolled in grade 9 or 10 are not in the IBDP or IBCC programmes.

https://ibanswers.ibo.org/app/answers/detail/a_id/5414/kw/pre-ib. Florida's Pre-IB courses should only be used in schools where MYP is not offered in order to prepare students to enter the IBDP. Teachers of Florida's Pre-IB courses should have undergone IB training in order to ensure seamless articulation for students within the subject area.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally

embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/si.pdf

GENERAL INFORMATION

	Course Path: Section: Grades Prek to 12 Education
Course Number: 2000800	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2000800	Education Courses > Subject: Science > SubSubject:
	Biological Sciences >
	Abbreviated Title: FL PRE-IB BIO 1
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
Course Type: Core Academic Course	Course Level: 3
Course Status: State Board Approved	
Grade Level(s): 9,10	
Graduation Requirement: Biology	

Educator Certifications

Science (Secondary Grades 7-12)	
Biology (Grades 6-12)	

Equivalent Courses

2000310-Biology 1

International Baccalaureate Biology 1 (#2000805) 2018-

And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

Course Number: 2000805

Number of Credits: One (1) credit

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: District-Determined Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Biological Sciences > Abbreviated Title: IB BIOLOGY 1 Course Length: Year (Y) Course Attributes: • International Baccalaureate (IB) Course Level: 3

Educator Certifications

Science (Secondary Grades 7-12)	
Biology (Grades 6-12)	

Equivalent Courses

2000805-International Baccalaureate Biology 1 Equivalency end year: 2018

International Baccalaureate Biology 2 (#2000810) 2018-

And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

Course Number: 2000810

Number of Credits: One (1) credit

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: District-Determined Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Biological Sciences > Abbreviated Title: IB BIO 2 Course Length: Year (Y) Course Attributes: • International Baccalaureate (IB) Course Level: 3

Educator Certifications

Science (Secondary Grades 7-12)	
Biology (Grades 6-12)	

Equivalent Courses

2000810-International Baccalaureate Biology 2 Equivalency end year: 2018

International Baccalaureate Biology 3 (#2000820) 2018-

And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

Course Number: 2000820

Number of Credits: One (1) credit

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: District-Determined Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Biological Sciences > Abbreviated Title: IB BIO 3 Course Length: Year (Y) Course Attributes: • International Baccalaureate (IB) Course Level: 3

Educator Certifications

Science (Secondary Grades 7-12)	
Biology (Grades 6-12)	

Equivalent Courses

2000820-International Baccalaureate Biology 3 Equivalency end year: 2018

International Baccalaureate Mid Years Prog Biology (#2000850) 2018 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2000950	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2000850	Education Courses > Subject: Science > SubSubject:
	Biological Sciences >
	Abbreviated Title: IB MYP BIOLOGY
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	 International Baccalaureate (IB)
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: District-Determined	

Educator Certifications

Middle Grades General Science (Middle Grades 5-9)	
Biology (Grades 6-12)	
Science (Secondary Grades 7-12)	

Equivalent Courses

2000850-International Baccalaureate Mid Years Prog Biology Equivalency end year: 2018

Science Transfer (#2000990) 2015 - 2022 (current)

General Course Information and Notes

GENERAL NOTES

SUBJECT AREA TRANSFER NUMBERS

Each course transferred into a Florida public school by an out-of-state or non-public school student should be matched with a course title and number when such course provides substantially the same content. However, a few transfer courses may not be close enough in content to be matched. For those courses a subject area transfer number is provided.

GENERAL INFORMATION

Course Number: 2000990

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Chemistry > Abbreviated Title: SCI TRAN Course Length: Not Applicable

Course Type: Transfer Course Course Status: Course Approved Grade Level(s): 9,10,11,12

Science Transfer (#2000990) 2022 - And Beyond

Name	Description
	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach.
MA.K12.MTR.1.1:	 Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose.
	Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations.
	 Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence.
	Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts.

MA.K12.MTR.5.1:	 Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations.
	 Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
	Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
MA.K12.MTR.7.1:	Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to
	do quality work.
-----------------	--
	Use appropriate voice and tone when speaking or writing.
	Clarifications:
ELA.KIZ.EE.O.I:	In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends
	differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.

GENERAL NOTES

SUBJECT AREA TRANSFER NUMBERS

Each course transferred into a Florida public school by an out-of-state or non-public school student should be matched with a course title and number when such course provides substantially the same content. However, a few transfer courses may not be close enough in content to be matched. For those courses a subject area transfer number is provided.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

GENERAL INFORMATION

Course Number: 2000990

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Chemistry > Abbreviated Title: SCI TRAN Course Length: Not Applicable

Course Type: Transfer Course Course Status: State Board Approved Grade Level(s): 9,10,11,12

Computer Science Substitution for Equally Rigorous Science (#2000998) 2020 - And Beyond (current)

General Course Information and Notes

VERSION DESCRIPTION

Section 1007.2616(6)(a), F.S., authorizes the substitution of up to one (1) mathematics credit (MA) and one (1) equally rigorous science (EQ) credit toward high school graduation for a student receiving a passing score on an industry certification examination and using an eligible computer science course containing content related to the course for which it is substituting. A listing of eligible computer science courses for the current school year is posted at https://www.fldoe.org/core/fileparse.php/7746/urlt/1819CompSci.pdf.

The school district would determine which industry certification exams (passing scores) can yield course substitutions for mathematics and science. It is important to note that one qualifying industry certification attainment equates to one substitution credit. A student would need to earn two distinct industry certifications tied to college credit in order to earn the maximum two substitution credits (one for math, one for science). The eligible industry certifications that are tied to statewide college credit may be found at https://www.fldoe.org/academics/career-adult-edu/career-technical-edu-agreements/industry-certification.stml.

Per statute, the substitution does not apply to Biology1 or other higher-level equally-rigorous science courses; higher-level courses are Level 3 courses in the Florida Course Code Directory.

Students who receive a course substitution earn course credit counted toward high school graduation. A course substitution does not factor into a student's grade point average (GPA).

Please note that course substitutions may not meet State University System (SUS) admission requirements or state scholarship program requirements.

QUALIFICATIONS

Not applicable

GENERAL INFORMATION

Course Number: 2000998

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Chemistry > Abbreviated Title: COMP SCI SUB EQ SCI Course Length: Not Applicable

Course Type: Course Substitution Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

CTE Industry Certification Science Substitution (#2000999) 2014 - 2022 (current)

General Course Information and Notes

VERSION DESCRIPTION

Section 1003.4282, F.S., authorizes the substitution of up to one (1) equally rigorous science credit (EQ) toward high school graduation for a student receiving a passing score on an industry certification examination. Only one substitution per industry certification attained is allowed.

The school district would determine which industry certification exams (passing scores) can yield course substitutions for science. It is important to note that one qualifying industry certification attainment equates to one substitution credit. The eligible industry certifications that are tied to statewide college credit may be found at https://www.fldoe.org/academics/career-adult-edu/career-technical-edu-agreements/industry-certification.stml.

Students who receive a course substitution earn course credit counted toward high school graduation. A course substitution does not factor into a student's grade point average (GPA).

GENERAL INFORMATION

Course Number: 2000999

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Chemistry > Abbreviated Title: CTE/IC SCI SUB Course Length: Not Applicable

Course Type: Course Substitution Course Status: State Board Approved

Graduation Requirement: Equally Rigorous Science

CTE Industry Certification Science Substitution (#2000999) 2022 - And Beyond

Name	Description
	Mathematicians who participate in effortful learning both individually and with others:
	 Analyze the problem in a way that makes sense given the task.
	Ask questions that will below with solving the task
	 Build perseverance by modifying methods as peeded while solving a challenging task
	State paragrad and maintain a positive maintain teacher warking to solve teach
	Stay engaged and maintain a positive minuser when working to solve tasks.
MA K12 MTR 1 1-	Help and support each other when attempting a new method or approach.
WART2.WITK.T.T.	Clarifications:
	Teachers who encourage students to participate actively in effortful learning both individually and with others:
	Cultivate a community of growth mindset learners.
	Foster perseverance in students by choosing tasks that are challenging.
	Develop students' ability to analyze and problem solve.
	Recognize students' effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple years
	Mathematicians who demonstrate understanding by representing problems in multiple ways:
	Matternational who demonstrate and estanding by representing problems in matterie ways.
	Build understanding through modeling and using manipulatives.
	Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
	 Progress from modeling problems with objects and drawings to using algorithms and equations.
	Express connections between concepts and representations.
MA.K12.MTR.2.1:	Choose a representation based on the given context or purpose.
	Clarifications
	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:
	Alla students make connections between consecutioning by representing problems in multiple ways.
	The provide constructions between concepts and representations.
	Provide opportunities for students to use manipulatives when investigating concepts.
	 Guide students from concrete to pictorial to abstract representations as understanding progresses.
	 Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency.
	Mathematicians who complete tasks with mathematical fluency:
	 Select efficient and appropriate methods for solving problems within the given context.
	Select endern and appropriate methods for solving problems within the given context. Maintain Baybility and aggregative performing procedures and montal salvalations.
	Maintain nextbility and accuracy while performing procedures and mental calculations.
	Complete tasks accurately and with confidence.
MA.K12.MTR.3.1:	Adapt procedures to apply them to a new context.
	Use feedback to improve efficiency when performing calculations.
	Clarifications:
	Teachers who encourage students to complete tasks with mathematical fluency:
	Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
	Offer multiple opportunities for students to practice efficient and generalizable methods.
	Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others.
	Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
	Communicate mathematical ideas, vocabulary and methods effectively.
	Analyze the mathematical thinking of others.
	Compare the efficiency of a method to those expressed by others.
	Recognize errors and suggest how to correctly solve the task.
	Justify results by explaining methods and processes.
MA.K12.MTR.4.1:	Construct possible arguments based on evidence.
	Clarifications
	Transforms who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:
	Fstablish a culture in which students ask questions of the teacher and their neers, and error is an opportunity for learning
	Create opportunities for students to discuss their thinking with poors
	Greate opportainties for students to discuss their trinking with peels. Salest sequence and precent students work to advance and deeper understanding of correct and increasingly officient worth officient worthofficient worth officient worth officient worth officient worth offi
	 Select, sequence and present student work to advance and deepen understanding or correct and increasingly efficient methods. Develop students' ability to institute methods and according to the institute present to the method.
	 Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts.
	Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
	Focus on relevant details within a problem
I	- i ocus on relevant details within a problem.

	 Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts.
MA.K12.MTR.5.1:	 Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations.
	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
	Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts:
	 Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
MA.K12.MTR.7.1:	Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.N 12.EE. 1. 1.	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade level complexity bands and a text complexity gybrie
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
	In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
	Clarifications:

ELA.K12.EE.5.1:	Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.

VERSION DESCRIPTION

Section 1003.4282, F.S., authorizes the substitution of up to one (1) equally rigorous science credit (EQ) toward high school graduation for a student receiving a passing score on an industry certification examination. Only one substitution per industry certification attained is allowed.

The school district would determine which industry certification exams (passing scores) can yield course substitutions for science. It is important to note that one qualifying industry certification attainment equates to one substitution credit. The eligible industry certifications that are tied to statewide college credit may be found at https://www.fldoe.org/academics/career-adult-edu/career-technical-edu-agreements/industry-certification.stml.

Students who receive a course substitution earn course credit counted toward high school graduation. A course substitution does not factor into a student's grade point average (GPA).

GENERAL INFORMATION

Course Number: 2000999

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Chemistry > Abbreviated Title: CTE/IC SCI SUB Course Length: Not Applicable

Course Type: Course Substitution Course Status: State Board Approved

Graduation Requirement: Equally Rigorous Science

Earth/Space Science (#2001310) 2015 - 2022 (current)

Name	Description
SC.912.E.5.1:	Cite evidence used to develop and verify the scientific theory of the Big Bang (also known as the Big Bang Theory) of the origin of the universe.
SC.912.E.5.2:	Identify patterns in the organization and distribution of matter in the universe and the forces that determine them.
SC.912.E.5.3:	Describe and predict how the initial mass of a star determines its evolution.
SC.912.E.5.4:	Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth.
SC.912.E.5.5:	Explain the formation of planetary systems based on our knowledge of our Solar System and apply this knowledge to newly discovered planetary systems.
SC.912.E.5.6:	Develop logical connections through physical principles, including Kepler's and Newton's Laws about the relationships and the effects of Earth, Moon, and Sun on each other.
SC.912.E.5.9:	Analyze the broad effects of space exploration on the economy and culture of Florida.
SC.912.E.5.11:	Distinguish the various methods of measuring astronomical distances and apply each in appropriate situations.
SC.912.E.6.1:	Describe and differentiate the layers of Earth and the interactions among them.
SC.912.E.6.2:	Connect surface features to surface processes that are responsible for their formation.
SC.912.E.6.3:	Analyze the scientific theory of plate tectonics and identify related major processes and features as a result of moving plates.
SC.912.E.6.4:	Analyze how specific geologic processes and features are expressed in Florida and elsewhere.
SC.912.E.6.5:	Describe the geologic development of the present day oceans and identify commonly found features.
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
SC.912.E.7.2:	Analyze the causes of the various kinds of surface and deep water motion within the oceans and their impacts on the transfer of energy between the poles and the equator.
SC.912.E.7.3:	Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.
SC.912.E.7.4:	Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans.
SC.912.E.7.5:	Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions.
SC.912.E.7.6:	Relate the formation of severe weather to the various physical factors.
SC.912.E.7.7:	Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.
SC.912.E.7.8:	Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually and collectively.
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.
SC.912.L.15.8:	Describe the scientific explanations of the origin of life on Earth.
SC.912.N.1.1:	 Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.

SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or
SC 012 D 10 10.	States of matter.
36.712.1.10.10.	Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety
SC.912.P.10.11:	issues.
SC.912.P.10.16:	Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and electric fields, and their application to modern technologies.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.10.19:	Explain that all objects emit and absorb electromagnetic radiation and distinguish between objects that are blackbody radiators and those that are not.
SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.
SC.912.P.12.2:	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.
SC.912.P.12.4:	Describe how the gravitational force between two objects depends on their masses and the distance between them.
LAFS.910.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
LAFS.910.RST.1.2:	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.2.5:	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LAFS.910.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.RST.3.8:	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
LAFS.910.RST.3.9:	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
LAFS.910.RST.4.10:	By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful well-reasoned exchange of ideas.
LAFS.910.SL.1.1:	 b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.910.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.910.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.

	e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
	f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implication or the significance of the topic).
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.910.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.910.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
LAFS.910.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.910.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.910.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star
MAFS.K12.MP.1.1:	 Make sense of problems and persevere in solving them. Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches. Standard Relation to Course: Supporting
	Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others.
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting
MAFS.K12.MP.4.1:	Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore compare predictions with data. Mathematically proficient students at various grade levels are able to

	identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.

VERSION DESCRIPTION

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

• Asking questions (for science) and defining problems (for engineering).

- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

GENERAL NOTES

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2001210	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2001310	Education Courses > Subject: Science > SubSubject:
	Earth/Space Sciences >
	Abbreviated Title: EARTH/SPA SCI
Number of Credits: One (1) credit	Course Length: Year (Y)
Course Type: Core Academic Course	Course Level: 2
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Educator Certifications

Science (Secondary Grades 7-12) Chemistry (Grades 6-12) Earth/Space Science (Grades 6-12) Physics (Grades 6-12) Middle Grades General Science (Middle Grades 5-9)

Earth/Space Science (#2001310) 2022 - And Beyond

Name	Description
SC.912.E.5.1:	Cite evidence used to develop and verify the scientific theory of the Big Bang (also known as the Big Bang Theory) of the origin of the universe.
SC.912.E.5.2:	Identify patterns in the organization and distribution of matter in the universe and the forces that determine them.
SC.912.E.5.3:	Describe and predict how the initial mass of a star determines its evolution.
SC.912.E.5.4:	Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth.
SC.912.E.5.5:	Explain the formation of planetary systems based on our knowledge of our Solar System and apply this knowledge to newly discovered planetary systems.
SC.912.E.5.6:	Develop logical connections through physical principles, including Kepler's and Newton's Laws about the relationships and the effects of Earth, Moon, and Sun on each other.
SC.912.E.5.9:	Analyze the broad effects of space exploration on the economy and culture of Florida.
SC.912.E.5.11:	Distinguish the various methods of measuring astronomical distances and apply each in appropriate situations.
SC.912.E.6.1:	Describe and differentiate the layers of Earth and the interactions among them.
SC.912.E.6.2:	Connect surface features to surface processes that are responsible for their formation.
SC.912.E.6.3:	Analyze the scientific theory of plate tectonics and identify related major processes and features as a result of moving plates.
SC.912.E.6.4:	Analyze how specific geologic processes and features are expressed in Florida and elsewhere.
SC.912.E.6.5:	Describe the geologic development of the present day oceans and identify commonly found features.
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
SC.912.E.7.2:	Analyze the causes of the various kinds of surface and deep water motion within the oceans and their impacts on the transfer of energy between the poles and the equator.
SC.912.E.7.3:	Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.
SC.912.E.7.4:	Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans.
SC.912.E.7.5:	Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions.
SC.912.E.7.6:	Relate the formation of severe weather to the various physical factors.
SC.912.E.7.7:	Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.
SC.912.E.7.8:	Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually and collectively.
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.
SC.912.L.15.8:	Describe the scientific explanations of the origin of life on Earth.
SC.912.N.1.1:	 Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.

SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC 912 P 10 4	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or
36.712.1.10.4.	states of matter.
SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).
SC.912.P.10.11:	Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues.
SC.912.P.10.16:	Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and electric fields, and their application to modern technologies.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.10.19:	Explain that all objects emit and absorb electromagnetic radiation and distinguish between objects that are blackbody radiators and those that are not.
SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.
SC.912.P.12.2:	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.
MA.K12.MTR.1.1:	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Ask questions that will help with solving methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach. Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems. Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Progress from modeling problems with objects and drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations.
MA.K12.MTR.2.1:	 Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	 Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.

MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
	 Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems.
	Connect solutions of problems to more complicated large-scale situations.
	 Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions.
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
	Clarifications:
	 Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts.
MA.K12.MTR.7.1:	 Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
	Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension.
	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.

	Use the accepted rules governing a specific format to create quality work.	
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.	
	Use appropriate voice and tone when speaking or writing.	
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.	
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.	
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.	

VERSION DESCRIPTION

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models
- Planning and carrying out investigations.
- Analyzing and interpreting data
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information.

GENERAL NOTES

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGl/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Course Number: 2001310

Number of Credits: One (1) credit Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Earth/Space Sciences > Abbreviated Title: EARTH/SPA SCI Course Length: Year (Y) Course Level: 2

Educator Certifications

cience (Secondary Grades 7-12)
hemistry (Grades 6-12)
arth/Space Science (Grades 6-12)
hysics (Grades 6-12)
liddle Grades General Science (Middle Grades 5-9)

Earth/Space Science Honors (#2001320) 2015 - 2022 (current)

Name	Description		
SC.912.E.5.1:	Cite evidence used to develop and verify the scientific theory of the Big Bang (also known as the Big Bang Theory) of the origin of the universe.		
SC.912.E.5.2:	Identify patterns in the organization and distribution of matter in the universe and the forces that determine them.		
SC.912.E.5.3:	Describe and predict how the initial mass of a star determines its evolution.		
SC.912.E.5.4:	Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth.		
SC.912.E.5.5:	Explain the formation of planetary systems based on our knowledge of our Solar System and apply this knowledge to newly discovered planetary		
SC.912.E.5.6:	systems. Develop logical connections through physical principles, including Kepler's and Newton's Laws about the relationships and the effects of Earth, Moon,		
	and Sun on each other.		
SC.912.E.5.7:	Relate the history of and explain the justification for future space exploration and continuing technology development.		
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.		
SC.912.E.5.9:	Analyze the broad effects of space exploration on the economy and culture of Florida.		
SC.912.E.5.10:	Describe and apply the coordinate system used to locate objects in the sky.		
SC.912.E.5.11:	Distinguish the various methods of measuring astronomical distances and apply each in appropriate situations.		
SC.912.E.6.1:	Describe and differentiate the layers of Earth and the interactions among them.		
SC.912.E.6.2:	Connect surface features to surface processes that are responsible for their formation.		
SC.912.E.6.3:	Analyze the scientific theory of plate tectonics and identify related major processes and features as a result of moving plates.		
SC.912.E.6.4:	Analyze how specific geologic processes and features are expressed in Florida and elsewhere.		
SC.912.E.6.5:	Describe the geologic development of the present day oceans and identify commonly found features.		
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.		
SC 912 F 7 2.	Analyze the causes of the various kinds of surface and deep water motion within the oceans and their impacts on the transfer of energy between the		
30.712.L.7.2.	poles and the equator.		
SC.912.E.7.3:	Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.		
SC.912.E.7.4:	Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans.		
SC.912.E.7.5:	Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions.		
SC.912.E.7.6:	Relate the formation of severe weather to the various physical factors.		
SC.912.E.7.7:	Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.		
SC.912.E.7.8:	Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually and collectively.		
SC.912.F.7.9:	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.		
0017121217171	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography		
SC.912.L.15.1:	molecular biology, and observed evolutionary change.		
SC.912.L.15.8:	Describe the scientific explanations of the origin of life on Earth.		
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.		
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical		
CO 010 N 4 4	thinking, and the active consideration of alternative scientific explanations to explain the data presented.		
SC.912.N.1.4:	Identity sources or information and assess their reliability according to the strict standards of scientific investigation.		
SC.912.N.1.5:	Describe and provide examples or now similar investigations conducted in many parts of the world result in the same outcome.		
SC.912.N.1.6:	Describe now scientific inferences are drawn from scientific observations and provide examples from the content being studied.		
SC.912.N.2.1:	identity what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).		
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.		

SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	weigh the ments of alternative strategies for solving a specific societal problem by comparing a number of dimenent costs and benefits, such as human, economic, and environmental.
SC.912.P.10.4:	bescribe near as the energy transferred by convection, conduction, and radiation, and explain the connection of near to change in temperature or states of matter.
SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).
SC.912.P.10.11:	explain and compare nuclear reactions (radioactive decay, inssion and rusion), the energy changes associated with them and their associated safety issues.
SC.912.P.10.16:	Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and electric fields, and their application to modern technologies.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.10.19:	Explain that all objects emit and absorb electromagnetic radiation and distinguish between objects that are blackbody radiators and those that are not.
SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.
SC.912.P.12.2:	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.
SC.912.P.12.4:	Describe how the gravitational force between two objects depends on their masses and the distance between them.
LAFS.910.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
LAFS.910.RST.1.2:	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.2.5:	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LAFS.910.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.RST.3.8:	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
LAFS.910.RST.3.9:	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
LAFS.910.RST.4.10:	By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.
	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9– 10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence
LAFS.910.SL.1.1:	 b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed.
	 c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their
	own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
	Write arguments focused on discipline-specific content.
	a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence
	b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s)

LAFS.910.WHST.1.1:	 and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.910.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications).
	or the significance of the topic).
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.910.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.910.WHST.2.6:	Use technology, including the internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
LAFS.910.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.910.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.910.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i> ★ Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★
MAFS.912.F-IF.3.7:	 a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.G-MG.1.2:	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★
MAFS.912.S-IC.2.6:	Evaluate reports based on data. * Represent data with plots on the real number line (dot plots, bistograms, and box plots). *
MAFS.912.S-ID.1.1:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard
MAFS.912.S-ID.1.2:	deviation) of two or more different data sets. ★ Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). 🖈
MAFS.912.S-ID.1.3:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. ★
MAFS.912.S-ID.2.5:	 Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. ★ Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models. b. Informally assess the fit of a function by plotting and analyzing residuals.
	c. Fit a linear function for a scatter plot that suggests a linear association.

MAFS.912.S-ID.2.6:

	Clarifications: Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others.
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting Model with mathematics.
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting Look for and make use of structure.
	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven

MAFS.K12.MP.7.1:	more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression x^2 + 9x + 14, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y. Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	standard kelation to course, supporting
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

While the content focus of this course is consistent with the Earth/Space Science course, students will explore these concepts in greater depth. In general, the academic pace and rigor will be greatly increased for honors level course work. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The course also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2001320

Number of Credits: One (1) credit

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Educator Certifications

Science (Secondary Grades 7-12) Chemistry (Grades 6-12) Physics (Grades 6-12) Earth/Space Science (Grades 6-12) Middle Grades General Science (Middle Grades 5-9)

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult

Education Courses > Subject: Science > SubSubject:

Abbreviated Title: EARTH/SPA SCI HON

Earth/Space Sciences >

Course Length: Year (Y) Course Attributes: • Honors

Course Level: 3

Earth/Space Science Honors (#2001320) 2022 - And Beyond

Name	Description		
SC.912.E.5.1:	Cite evidence used to develop and verify the scientific theory of the Big Bang (also known as the Big Bang Theory) of the origin of the universe.		
SC.912.E.5.2:	Identify patterns in the organization and distribution of matter in the universe and the forces that determine them.		
SC.912.E.5.3:	Describe and predict how the initial mass of a star determines its evolution.		
SC.912.E.5.4:	Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth.		
SC.912.E.5.5:	Explain the formation of planetary systems based on our knowledge of our Solar System and apply this knowledge to newly discovered planetary		
SC.912.E.5.6:	systems. Develop logical connections through physical principles, including Kepler's and Newton's Laws about the relationships and the effects of Earth, Moon,		
	and Sun on each other.		
SC.912.E.5.7:	Relate the history of and explain the justification for future space exploration and continuing technology development.		
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.		
SC.912.E.5.9:	Analyze the broad effects of space exploration on the economy and culture of Florida.		
SC.912.E.5.10:	Describe and apply the coordinate system used to locate objects in the sky.		
SC.912.E.5.11:	Distinguish the various methods of measuring astronomical distances and apply each in appropriate situations.		
SC.912.E.6.1:	Describe and differentiate the layers of Earth and the interactions among them.		
SC.912.E.6.2:	Connect surface features to surface processes that are responsible for their formation.		
SC.912.E.6.3:	Analyze the scientific theory of plate tectonics and identify related major processes and features as a result of moving plates.		
SC.912.E.6.4:	Analyze how specific geologic processes and features are expressed in Florida and elsewhere.		
SC.912.E.6.5:	Describe the geologic development of the present day oceans and identify commonly found features.		
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.		
SC 912 F 7 2.	Analyze the causes of the various kinds of surface and deep water motion within the oceans and their impacts on the transfer of energy between the		
30.712.L.7.2.	poles and the equator.		
SC.912.E.7.3:	Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.		
SC.912.E.7.4:	Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans.		
SC.912.E.7.5:	Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions.		
SC.912.E.7.6:	Relate the formation of severe weather to the various physical factors.		
SC.912.E.7.7:	Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.		
SC.912.E.7.8:	Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually and collectively.		
SC.912.F.7.9:	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.		
0017121217171	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography		
SC.912.L.15.1:	molecular biology, and observed evolutionary change.		
SC.912.L.15.8:	Describe the scientific explanations of the origin of life on Earth.		
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.		
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical		
CO 010 N 4 4	thinking, and the active consideration of alternative scientific explanations to explain the data presented.		
SC.912.N.1.4:	Identity sources or information and assess their reliability according to the strict standards of scientific investigation.		
SC.912.N.1.5:	Describe and provide examples or now similar investigations conducted in many parts of the world result in the same outcome.		
SC.912.N.1.6:	Describe now scientific inferences are drawn from scientific observations and provide examples from the content being studied.		
SC.912.N.2.1:	identity what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).		
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.		

SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter.
SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).
SC.912.P.10.11:	Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues.
SC.912.P.10.16:	Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and electric fields, and their application to modern technologies.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.10.19:	Explain that all objects emit and absorb electromagnetic radiation and distinguish between objects that are blackbody radiators and those that are not.
SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.
SC.912.P.12.2:	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.
SC.912.P.12.4:	Describe how the gravitational force between two objects depends on their masses and the distance between them.
	Mathematicians who participate in effortful learning both individually and with others:
	Analyze the problem in a way that makes sense given the task. Ask questions that will belo with solving the task
	 Build perseverance by modifying methods as needed while solving a challenging task.
	Stay engaged and maintain a positive mindset when working to solve tasks.
	Help and support each other when attempting a new method or approach.
MA.K12.MTR.1.1:	Clarifications:
	Teachers who encourage students to participate actively in effortful learning both individually and with others:
	Cultivate a community of growth mindset learners.
	Foster perseverance in students by choosing tasks that are challenging.
	Develop students' ability to analyze and problem solve. Becognize students' effort when solving shallonging problems
	Recognize students error when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:
	Build understanding through modeling and using manipulatives.
	Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
	 Progress from modeling problems with objects and drawings to using algorithms and equations.
	Express connections between concepts and representations.
MA.K12.MTR.2.1:	Choose a representation based on the given context or purpose.
	Clarifications:
	Help students make connections between concepts and representations
	 Provide opportunities for students to use manipulatives when investigating concepts.
	Guide students from concrete to pictorial to abstract representations as understanding progresses.
	Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:
	 Calast afficient and anneopoints math ado for calving problems within the given parts at
	Select enricent and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations
	Complete tasks accurately and with confidence.
	Adapt procedures to apply them to a new context.
MA.K12.MTR.3.1:	Use feedback to improve efficiency when performing calculations.
	Clarifications:
	Teachers who encourage students to complete tasks with mathematical fluency:
	Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
	 Other multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	From the opportaining for station to render on the method and determine in a more emident method todad have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:

Section 2010 Process of section 2010 (Control of the Section 2010) Process of the control of the Section 2010 (Control of the Section 2010) Process of the Control of the Section 2010 (Control of the Section 2010) Process of the Control of the Section 2010 (Control of the Section 2010) Process of the Control of the Section 2010 (Control of the Section 2010) Process of the Control of the Section 2010 (Control of the Section 2010) Process of the Section 2010 (Control of the Section 2010) Process of the Section 2010 (Control of the Section 2010) Process of the Section 2010 (Control of the Section 2010) Process of the Section 2010 (Control of the Section 2010) Process of the Section 2010 (Control of the Section 2010) Process of the Section 2010 (Control of the Section 2010) Process of the Section 2010 (Control of the Section 2010) Process of the Section 2010 (Control of the Section 2010) Process of the Section 2010 (Control of the Section 2010) Process of the Section 2010 (Control of the Section 2010) Process of the Section 2010 (Control of the Section 2010) Process of the Section 2010 (Control of the Section 2010) Process of the Section 2010 (Control of the Section 2010) Process of the Section 2010 (Control of the Section 2010) Process of the Section 2010 (Control of the Section 2010) Process of the Section 2010 (Control of the Section 2010) Process of the Section 2010 (Control of the Section 2010) Process of the Section 2010 (Control of the Section 2010) Process of the Section 2010 (Control of the Section 2010) Process of the Section 2010 (Control of the Section 2010) Process of the Section 2010 (Control of the Section 2010) Process of the Sect	MA.K12.MTR.4.1:	 Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
 Develop suddents' allely to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions: Estimate to discour possible solutions: Estimate to discour possible solutions: Use bonchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Exclusite feature relations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students continuely ask. "Does this solution make sense? How do you know?" Reinforce that students continuely ask. "Does this solution make sense? How do you know?" Reinforce that students contravely solutions through justifications. Verify possibility to verify solutions. Verify possibility to verify solutions. Verify possibility to verify solutions. Verify possibility to verify solution through justifications. Verifications: Connect mathematical concepts to everyday experiences. Use models and methods to understand. "Represent and solve problems. Perform investigations to gativer the acurury of theim models and methods. 	MA.K12.MTR.5.1:	 Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Evolve provide onportunities for students to create plans and procedures to solve problems. Support students to develop generalizations based on the similarities found among problems.
Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. ELA.K12.EE.1.1: 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writi	MA.K12.MTR.6.1:	 Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Have students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
ELA.K12.EE.1.1: Cite evidence to explain and justify reasoning. ELA.K12.EE.1.1: Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. ELA.K12.EE.1.1: 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently.	MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently.

	See Text Complexity for grade-level complexity bands and a text complexity rubric.	
	Make inferences to support comprehension.	
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.	
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.	
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.	
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.	
	Use the accepted rules governing a specific format to create quality work.	
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.	
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing.	
	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.	
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.	
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.	

GENERAL NOTES

While the content focus of this course is consistent with the Earth/Space Science course, students will explore these concepts in greater depth. In general, the academic pace and rigor will be greatly increased for honors level course work. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- · Planning and carrying out investigations.
- Analyzing and interpreting data.
- · Using mathematics, information and computer technology, and computational thinking.
- · Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2001220	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2001320	Education Courses > Subject: Science > SubSubject:
	Earth/Space Sciences >
	Abbreviated Title: EARTH/SPA SCI HON
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
Course Type: Core Academic Course	Course Level: 3
Course Status: State Board Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Educator Certifications

cience (Secondary Grades 7-12)	
hemistry (Grades 6-12)	
hysics (Grades 6-12)	
arth/Space Science (Grades 6-12)	
liddle Grades General Science (Middle Grades 5-9)	

Meteorology Honors (#2001330) 2019 - 2022 (current)

Name	Description	
SC.912.CS-CP.1.3:	Analyze and manipulate data collected by a variety of data collection techniques to support a hypothesis.	
SC.912.CS-CP.1.4:	Collect real-time data from sources such as simulations, scientific and robotic sensors, and device emulators, using this data to formulate strategies or algorithms to solve advanced problems.	
SC.912.CS-CS.1.1:	Analyze data and identify real-world patterns through modeling and simulation.	
SC.912.CS-CS.1.3:	Explain how data analysis is used to enhance the understanding of complex natural and human systems.	
SC.912.E.5.4:	Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth.	
SC.912.E.5.7:	Relate the history of and explain the justification for future space exploration and continuing technology development.	
SC.912.E.6.6:	Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies.	
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.	
SC.912.E.7.2:	Analyze the causes of the various kinds of surface and deep water motion within the oceans and their impacts on the transfer of energy between the poles and the equator.	
SC.912.E.7.3:	Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.	
SC.912.E.7.4:	Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans.	
SC.912.E.7.5:	Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions.	
SC.912.E.7.6:	Relate the formation of severe weather to the various physical factors.	
SC.912.E.7.7:	Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.	
SC.912.E.7.8:	Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually and collectively.	
SC.912.E.7.9:	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.	
SC.912.L.17.3:	Discuss how various oceanic and freshwater processes, such as currents, tides, and waves, affect the abundance of aquatic organisms.	
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.	
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.	
SC.912.L.17.10:	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.	
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.	
SC.912.L.17.12:	Discuss the political, social, and environmental consequences of sustainable use of land.	
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.	
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.	
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.	
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.	
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others. 	
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.	
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.	
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.	
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.	
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.	
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.	

SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.
SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.10.19:	Explain that all objects emit and absorb electromagnetic radiation and distinguish between objects that are blackbody radiators and those that are not.
LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful well-reasoned exchange of ideas
LAFS.1112.SL.1.1:	 b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed.
	 c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions.
	when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.910.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.SL.1.1:	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively
	 Incorporate others into the discussion; and clarity, verify, or challenge ideas and conclusions. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

LAFS.910.WHST.1.2:	 b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
MAFS.912.S-IC.2.6:	Evaluate reports based on data. * Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Construct viable arguments and critique the reasoning of others.
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Model with mathematics.
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Look for and make use of structure.

MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
HE.912.C.1.3:	Evaluate how environment and personal health are interrelated.
	Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
HE.912.C.1.4:	Propose strategies to reduce or prevent injuries and health problems.
	Clarifications: Mandatory passenger-restraint/helmet laws, refusal skills, mandatory immunizations, healthy relationship skills, and improved inspection of food sources.

VERSION DESCRIPTION

This interdisciplinary science course covers the fundamentals of meteorology, emphasizing the physical and chemical processes that control Earth's weather and climate. Course topics include solar energy, atmospheric and oceanic movement, and energy transfer. Students will study and practice weather prediction using technology, data and models. In addition, students will learn the forces behind the formation of severe weather events. The course will **cover the history of Earth's climate and the practices** and tools used to study meteorology as well as the forces behind fluctuations in the **Earth's weather and climate over time such as Milankovich Cycles**, and ice ages. Students have the opportunity to access real-world empirical data to study weather patterns both globally and locally, model the processes that impact changes using basic mathematical expressions, graphing and statistics, and test the relationship between predictions and observations. The course also includes opportunities to practice science literacy by teaching from a range of complex texts that vary in length, and feature empirical evidence. Students will also be provided extensive research and writing opportunities (claims and evidence).

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

This course has been designed for the teacher to select and teach only the appropriate standards corresponding to a student's grade level and/or instructional needs.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2001220	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2001330	Education Courses > Subject: Science > SubSubject
	Earth/Space Sciences >
	Abbreviated Title: Meteorology Honors
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
Course Type: Elective Course	Course Level: 3

Educator Certifications

	_
nistry (Grades 6-12)	
US (GLADES 6-12)	
$g_{\rm V}$ (Crades 6.12)	
(Grades 0-12)	
VSnace Science (Grades 6.12)	
inspace science (stades s-12)	

Meteorology Honors (#2001330) 2022 - And Beyond

Name	Description	
SC.912.CS-CP.1.3:	Analyze and manipulate data collected by a variety of data collection techniques to support a hypothesis.	
	Collect real-time data from sources such as simulations, scientific and robotic sensors, and device emulators, using this data to formulate strategies	
56.712.05 GI . I . I .	or algorithms to solve advanced problems.	
SC.912.CS-CS.1.1:	Analyze data and identify real-world patterns through modeling and simulation.	
SC.912.CS-CS.1.3:	Explain how data analysis is used to enhance the understanding of complex natural and human systems.	
SC.912.E.5.4:	Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth.	
SC.912.E.5.7:	Relate the history of and explain the justification for future space exploration and continuing technology development.	
SC.912.E.6.6:	Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies.	
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.	
SC.912.E.7.2:	Analyze the causes of the various kinds of surface and deep water motion within the oceans and their impacts on the transfer of energy between the poles and the equator.	
SC.912.E.7.3:	Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.	
SC.912.E.7.4:	Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans.	
SC.912.E.7.5:	Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions.	
SC.912.E.7.6:	Relate the formation of severe weather to the various physical factors.	
SC.912.E.7.7:	Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.	
SC.912.E.7.8:	Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually and collectively.	
SC.912.E.7.9:	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.	
SC.912.L.17.3:	Discuss how various oceanic and freshwater processes, such as currents, tides, and waves, affect the abundance of aquatic organisms.	
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.	
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.	
SC.912.L.17.10:	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.	
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.	
SC.912.L.17.12:	Discuss the political, social, and environmental consequences of sustainable use of land.	
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.	
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.	
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.	
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.	
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others. 	
SC 912 N 1 2	Describe and explain what characterizes science and its methods	
00.712.14.1.2.	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical	
SC.912.N.1.3:	thinking, and the active consideration of alternative scientific explanations to explain the data presented.	
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.	
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.	
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.	
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.	

SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.		
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.		
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.		
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.		
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.		
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.		
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.		
SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter.		
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.		
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.		
SC.912.P.10.19:	Explain that all objects emit and absorb electromagnetic radiation and distinguish between objects that are blackbody radiators and those that are not.		
	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach. 		
MA.K12.MTR.1.1:	Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.		
MA.K12.MTR.2.1:	 Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Orivide opportunities for students to use manipulatives when investigating concepts. Cuide at udants from context to a picture to a presentation and representations. 		
MA.K12.MTR.3.1:	 Show students that various representations can have different purposes and can be useful in different situations. Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. 		
	 Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used. 		
MA.K12.MTR.4.1:	 Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask guestions of the teacher and their procession and errors is an expectively for learning.		
	Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.		

	 Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts.
MA.K12.MTR.5.1:	 Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations.
	 Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
MA.K12.MTR.6.1:	 Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts:
	 Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
	 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
	Clarifications: In kindergarten, students learn to listen to one another respectfully.

ELA.K12.EE.4.1:	In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
	Evaluate how environment and personal health are interrelated.
HE.912.C.1.3:	Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
	Propose strategies to reduce or prevent injuries and health problems.
HE.912.C.1.4:	Clarifications: Mandatory passenger-restraint/helmet laws, refusal skills, mandatory immunizations, healthy relationship skills, and improved inspection of food sources.

VERSION DESCRIPTION

This interdisciplinary science course covers the fundamentals of meteorology, emphasizing the physical and chemical processes that control Earth's weather and climate. Course topics include solar energy, atmospheric and oceanic movement, and energy transfer. Students will study and practice weather prediction using technology, data and models. In addition, students will learn the forces behind the formation of severe weather events. The course will cover the history of Earth's climate and the practices and tools used to study meteorology as well as the forces behind fluctuations in the Earth's weather and climate over time such as Milankovich Cycles, and ice ages. Students have the opportunity to access real-world empirical data to study weather patterns both globally and locally, model the processes that impact changes using basic mathematical expressions, graphing and statistics, and test the relationship between predictions and observations. The course also includes opportunities to practice science literacy by teaching from a range of complex texts that vary in length, and feature empirical evidence. Students will also be provided extensive research and writing opportunities (claims and evidence).

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

This course has been designed for the teacher to select and teach only the appropriate standards corresponding to a student's grade level and/or instructional needs.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number 2001220	Courses > Grade Group: Grades 9 to 12 and Adult
course number: 2001330	Education Courses > Subject: Science > SubSubject:
	Earth/Space Sciences >
	Abbreviated Title: Meteorology Honors
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
Course Type: Elective Course	Course Level: 3
Course Status: State Board Approved	
Chemistry (Grades 6-12)	
-----------------------------------	--
Physics (Grades 6-12)	
Biology (Grades 6-12)	
Earth/Space Science (Grades 6-12)	

Environmental Science (#2001340) 2015 - 2022 (current)

Name	Description
SC.912.E.6.6:	Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies.
SC.912.E.7.7:	Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.
SC 912 F 7 8	Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually
56.712.E.7.0.	and collectively.
SC.912.E.7.9:	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.15.3:	Describe how biological diversity is increased by the origin of new species and how it is decreased by the natural process of extinction.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.17.1:	Discuss the characteristics of populations, such as number of individuals, age structure, density, and pattern of distribution.
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.5:	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.
SC.912.L.17.6:	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.
SC.912.L.17.7:	Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.17.10:	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.12:	Discuss the political, social, and environmental consequences of sustainable use of land.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.14:	Assess the need for adequate waste management strategies.
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
SC.912.L.17.18:	Describe how human population size and resource use relate to environmental quality.
SC.912.L.17.19:	Describe how different natural resources are produced and how their rates of use and renewal limit availability.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC 012 N 1 2	Describe and explain what characterizes science and its methods
SC.912.N.1.2:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thicking and the active consideration of alternative scientific and logical thicking and the active consideration of alternative scientific and logical thicking and the active consideration of alternative scientific and logical thicking and the active consideration of alternative scientific and logical thicking and the active consideration of alternative scientific and logical thicking and the active consideration of alternative scientific and logical thicking and the active consideration of alternative scientific and logical the active constraints and logical
SC 912 N 1 4	thinking, and the active consideration or alternative scientific explanations to explain the data presented.
SC 012 N 1 5	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome
SC 012 N 1 4	Describe and provide examples of now similar investigations conducted in many parts of the world result in the same outcome.
SC 012 N 2 1	Identify what is science, what clearly is not science, and what superficially recombles science (but fails to most the aritaria for science)
30.912.10.2.1:	Identify what is suchce, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	questions addressed by other ways of knowing, such as art, philosophy, and religion.
	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and

SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger,
	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial
SC.912.N.3.1:	range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1.	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.
LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LAFS.1112.RST.4.10:	By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.
LAFS.1112.SL.1.1:	 11-12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.1112.WHST.1.1:	 a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic: convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience

1	
LAFS.1112.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.1112.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.1112.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i>
	Represent data with plots on the real number line (dot plots, histograms, and box plots). *
MAFS.912.S-ID.1.1:	In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ★
MAFS.912.S-ID.1.2:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). 🖈
MAFS.912.S-ID.1.3:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. \star
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting Model with mathematics
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense possibly improving the model if it has not served its purpose.

	Standard Relation to Course: Supporting
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $3 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y .
	Standard Relation to Course: Supporting
MAFS.K12.MP.8.1:	Look for and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
HE.912.C.1.3:	Evaluate how environment and personal health are interrelated. Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
	Analyze how heredity and family history can impact personal health.
HE.912.C.1.7:	Clarifications: Drug use, family obesity, heart disease, mental health, and non-communicable illness or disease.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- $\ensuremath{\text{2.}}$ Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGl/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2001240	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2001340	Education Courses > Subject: Science > SubSubject:
	Environmental Science >
	Abbreviated Title: ENV SCI
Number of Credits: One (1) credit	Course Length: Year (Y)
Course Type: Core Academic Course	Course Level: 2
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Educator Certifications

Science (Secondary Grades 7-12) Biology (Grades 6-12) Chemistry (Grades 6-12) Earth/Space Science (Grades 6-12) Middle Grades General Science (Middle Grades 5-9)

Environmental Science (#2001340) 2022 - And Beyond

Name	Description
SC.912.E.6.6:	Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies.
SC.912.E.7.7:	Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.
SC.912.E.7.8:	Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually and collectively.
SC.912.E.7.9:	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.15.3:	Describe how biological diversity is increased by the origin of new species and how it is decreased by the natural process of extinction.
SC 012 15 12	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which
SC.912.L.15.13:	result in differential reproductive success.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.17.1:	Discuss the characteristics of populations, such as number of individuals, age structure, density, and pattern of distribution.
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.5:	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.
SC.912.L.17.6:	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.
SC.912.L.17.7:	Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.1.17.10:	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.12:	Discuss the political, social, and environmental consequences of sustainable use of land.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.14:	Assess the need for adequate waste management strategies.
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
SC.912.L.17.18:	Describe how human population size and resource use relate to environmental quality.
SC.912.L.17.19:	Describe how different natural resources are produced and how their rates of use and renewal limit availability.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC 912 N 1 2	Describe and explain what characterizes science and its methods
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific evaluations to evaluate the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.2.1	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science)
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion
	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and

SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.
	Mathematicians who participate in effortful learning both individually and with others:
	Analyze the problem in a way that makes sense given the task. Ask questions that will below the solving the task
	 Build perseverance by modifying methods as needed while solving a challenging task.
	 Stay engaged and maintain a positive mindset when working to solve tasks.
	Help and support each other when attempting a new method or approach.
MA.K12.MTR.1.1:	Clarifications:
	Teachers who encourage students to participate actively in effortful learning both individually and with others:
	Cultivate a community of growth mindset learners.
	 Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to apply and problem solve.
	Recognize students' effort when solving challenging problems
	Demonstrate understanding by representing problems in multiple ways
	Mathematicians who demonstrate understanding by representing problems in multiple ways:
	Build understanding through modeling and using manipulatives.
	Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
	Progress from modeling problems with objects and drawings to using algorithms and equations.
	 Express connections between concepts and representations. Choose a representation based on the given context or purpose.
MART2.WITK.2.1.	Clarifications:
	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:
	Help students make connections between concepts and representations.
	Provide opportunities for students to use manipulatives when investigating concepts.
	Guide students from concrete to pictorial to abstract representations as understanding progresses.
	Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:
	Select efficient and appropriate methods for solving problems within the given context.
	Maintain flexibility and accuracy while performing procedures and mental calculations.
	Complete tasks accurately and with confidence.
MA.K12.MTR.3.1:	Adapt procedures to apply them to a new context.
	Use reedback to improve efficiency when performing calculations.
	Clarifications: Teachers who encourage students to complete tasks with mathematical fluency:
	 Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
	Offer multiple opportunities for students to practice efficient and generalizable methods.
	• Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
	Communicate mathematical ideas, vocabulary and methods effectively.
	Analyze the mathematical thinking of others.
	Compare the efficiency of a method to those expressed by others.
	Recognize errors and suggest how to correctly solve the task.
MA.K12.MTR.4.1:	 Justify results by explaining methods and processes. Construct possible arguments based on evidence.
	Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:
	• Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.
	Create opportunities for students to discuss their thinking with peers.
	Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.
	Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
	Focus on relevant details within a problem.
	Create plans and procedures to logically order events, steps or ideas to solve problems.
	Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts
	 Relate previously rearried concepts to new concepts.

MA.K12.MTR.5.1:	Look for similarities among problems.
	Connect solutions of problems to more complicated large-scale situations.
	Clarifications:
	Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
	Support students to develop generalizations based on the similarities found among problems.
	Provide opportunities for students to create plans and procedures to solve problems.
	• Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
	Estimate to discover possible solutions.
	Use benchmark quantities to determine if a solution makes sense.
	Check calculations when solving problems.
	Verify possible solutions by explaining the methods used.
IVIA.K 12.IVI1R.6.1:	Evaluate results based on the given context.
	Teachers who encourage students to assess the reasonableness of solutions:
	Have students estimate or predict solutions prior to solving.
	Prompt students to continually ask, "Does this solution make sense? How do you know?"
	Reinforce that students check their work as they progress within and after a task.
	Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts:
	Connect mathematical concepts to everyday experiences.
	Use models and methods to understand, represent and solve problems.
	Perform investigations to gather data or determine if a method is appropriate. Redesign models and methods to improve accuracy or
MA.K12.MTR.7.1:	efficiency.
	Clarifications:
	Provide opportunities for students to create models, both concrete and abstract, and perform investigations
	 Challenge students to question the accuracy of their models and methods.
	 Support students as they validate conclusions by comparing them to the given situation.
	Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning
	one officine to oppoint and justify rousening.
	Clarifications:
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	 Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide
ELA.K12.EE.1.1:	 Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
ELA.K12.EE.1.1:	 Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation.
ELA.K12.EE.1.1:	 Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.1.1:	 Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.1.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.1.1: ELA.K12.EE.2.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complexitex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.1.1: ELA.K12.EE.2.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension
ELA.K12.EE.1.1: ELA.K12.EE.2.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension.
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complexity bands and a text complexity rubric. Make Inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smilling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide reference dby the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening ski
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: Is a
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1: ELA.K12.EE.4.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that theyve directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1: ELA.K12.EE.4.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that theyve directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the gif smilling?" or make predictions about what will happen based on the title page. Students will use the terms and apply t
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1: ELA.K12.EE.4.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect ditations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly guoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smilling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1: ELA.K12.EE.4.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smilling" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In Kindergarten, students learn to listen to one another respectfully. In grades 3-12, students learn to listen to one another respectfully. In grades 3-12, students learn to listen to one another respectfully. In grades 3-12, students learn to listen to conversations, discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1: ELA.K12.EE.4.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 15t grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening ski
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1: ELA.K12.EE.4.1: ELA.K12.EE.5.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that theyve directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smilling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1: ELA.K12.EE.4.1: ELA.K12.EE.5.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their writing and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In grades 3-12, students before to lower sations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence. Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate these skills learned into work products to produce quality work. Clarifications: Students will

ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing.
	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
	Evaluate how environment and personal health are interrelated.
HE.912.C.1.3:	Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
HE.912.C.1.7:	Analyze how heredity and family history can impact personal health.
	Clarifications: Drug use, family obesity, heart disease, mental health, and non-communicable illness or disease.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- · Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Number of Credits: One (1) credit Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Environmental Science > Abbreviated Title: ENV SCI Course Length: Year (Y) Course Level: 2

icience (Secondary Grades 7-12)	
Siology (Grades 6-12)	
Chemistry (Grades 6-12)	
Carth/Space Science (Grades 6-12)	
/liddle Grades General Science (Middle Grades 5-9)	

Environmental Science Honors (#2001341) 2016 - 2022 (current)

Name	Description
SC.912.E.6.6:	Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies.
SC.912.E.7.4:	Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans.
SC.912.E.7.7:	Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.
SC.912.E.7.8:	Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually and collectively.
SC.912.E.7.9:	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.15.3:	Describe how biological diversity is increased by the origin of new species and how it is decreased by the natural process of extinction.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.17.1:	Discuss the characteristics of populations, such as number of individuals, age structure, density, and pattern of distribution.
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.5:	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.
SC.912.L.17.6:	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.
SC.912.L.17.7:	Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.17.10:	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.12:	Discuss the political, social, and environmental consequences of sustainable use of land.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.14:	Assess the need for adequate waste management strategies.
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
SC.912.L.17.17:	Assess the effectiveness of innovative methods of protecting the environment.
SC.912.L.17.18:	Describe how human population size and resource use relate to environmental quality.
SC.912.L.17.19:	Describe how different natural resources are produced and how their rates of use and renewal limit availability.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: 1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). 2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
SC 012 N 1 1.	5. Plan investigations, (Design and evaluate a scientific investigation).
50.912.IN.1.1:	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	set-up, calibration, technique, maintenance, and storage).
	7. Pose answers, explanations, or descriptions of events,
	8. Generate explanations that explicate or describe natural phenomena (inferences),
	9. Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC 912 N 1 2	Describe and explain what characterizes science and its methods
50.712.IN.1.2.	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on, critical and logical
SC.912.N.1.3:	thinking and the active consideration of alternative scientific explanations to explain the data presented
SC 912 N 1 4	Identify sources of information and assess their reliability according to the strict standards of scientific investigation
SC 912 N 1 5	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome
SC 912 N 1 6	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied
36.712.IN.1.0.	beschool now scientific interences are unawith our scientific observations and provide examples from the content being studied.

SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.
SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter.
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LAFS.1112.RST.4.10:	By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.
	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades
	11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
	a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence
	h. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as
LAFS.1112.SL.1.1:	needed.
	c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions or a table or locus clerify, work, and expellence and conclusions; and promote divergent and erective perspectives
	d. Respond thoughtfully to diverse perspectives: synthesize comments, claims, and evidence made on all sides of an issue: resolve contradictions
	when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning
LAFS.1112.SL.2.4:	alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of
	findings, reasoning, and evidence and to add interest.
	a Introduce precise knowledgeable claim(s) establish the significance of the claim(s) distinguish the claim(s) from alternate or opposing claims
	and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence.
	 b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level.
LAFS.1112.WHST.1.1:	concerns, values, and possible biases.
	c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships
	between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
	d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.1112.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or
	or oaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively: assess the strengths and
LAFS.1112.WHST.3.8:	limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
LAFS.1112.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of
	discipline-specific fasks, purposes, and audiences.

LAFS.910.RST.1.2:	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.2.5:	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LAFS.910.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
LAFS.910.RST.3.8:	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
LAFS.910.RST.3.9:	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
LAFS.910.RST.4.10: LAFS.910.SL.1.1:	 By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.910.WHST.1.1:	 a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.910.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.910.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
LAFS.910.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.910.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
LAFS.910.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
SS.912.G.1.1:	Design maps using a variety of technologies based on descriptive data to explain physical and cultural attributes of major world regions. Analyze geographic information from a variety of sources including primary sources, atlases, computer, and digital sources, Geographic Information Systems (GIS), and a broad variety of maps.
SS.912.G.1.4:	Clarifications: Examples are thematic, contour, and dot-density.
SS.912.G.3.1:	Use geographic terms to locate and describe major ecosystems of Earth.
SS.912.G.3.2:	Use geographic terms and tools to explain how weather and climate influence the natural character of a place.
SS.912.G.3.3:	Use geographic terms and tools to explain differing perspectives on the use of renewable and non-renewable resources in Florida, the United States, and the world.
SS.912.G.3.5:	Use geographic terms and tools to explain how hydrology influences the physical character of a place.
SS.912.G.5.1:	Analyze case studies of how the Earth's physical systems affect humans.
55.912.G.5.2: SS 912 G 5 3	Analyze case studies of how changes in the physical environment of a place can increase or diminish its capacity to support human activity.
SS.912.G.5.4:	Analyze case studies of how humans impact the diversity and productivity of ecosystems.
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts: intervals where the function is increasing, decreasing, positive, or negative: relative maximums and minimums; symmetries; end behavior; and periodicity.</i> ★ Represent data with plots on the real number line (dot plots, histograms, and box plots). ★

MAFS.912.S-ID.1.1:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.	
MAFS.912.S-ID.1.2:	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. \star	
	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.	
MAFS.912.S-ID.1.3:	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). 🛧	
	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.	
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. \star	
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.	
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.	
HE.912.C.1.3:	Evaluate how environment and personal health are interrelated. Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.	

GENERAL NOTES

This course is designed as an interdisciplinary course to provide students with scientific principles, concepts, and methodologies required to identify and analyze environmental problems and to evaluate risks and alternative solutions for resolving and/or preventing them. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p.3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have skills to aggregate, interpret, and present the resulting data (NRC, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development (ELD) Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills.

To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

GENERAL INFORMATION

Course Number: 2001341

Number of Credits: One (1) credit

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Environmental Science > Abbreviated Title: ENV SCI HON Course Length: Year (Y) Course Attributes: • Honors Course Level: 3

cience (Secondary Grades 7-12)	
iology (Grades 6-12)	
hemistry (Grades 6-12)	
arth/Space Science (Grades 6-12)	

Environmental Science Honors (#2001341) 2022 - And Beyond

Name	Description		
SC.912.E.6.6:	Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies.		
SC.912.E.7.4:	Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans.		
SC.912.E.7.7:	Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.		
SC.912.E.7.8:	Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually and collectively.		
SC.912.E.7.9:	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.		
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.		
SC.912.L.15.3:	Describe how biological diversity is increased by the origin of new species and how it is decreased by the natural process of extinction.		
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.		
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.		
SC.912.L.17.1:	Discuss the characteristics of populations, such as number of individuals, age structure, density, and pattern of distribution.		
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.		
SC.912.L.17.5:	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.		
SC.912.L.17.6:	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.		
SC.912.L.17.7:	Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.		
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.		
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.		
SC.912.L.17.10:	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.		
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.		
SC.912.L.17.12:	Discuss the political, social, and environmental consequences of sustainable use of land.		
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.		
SC.912.L.17.14:	Assess the need for adequate waste management strategies.		
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.		
SC 010 L 17 1/.	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone		
30.912.L.17.10.	depletion, and surface and groundwater pollution.		
SC.912.L.17.17:	Assess the effectiveness of innovative methods of protecting the environment.		
SC.912.L.17.18:	Describe how human population size and resource use relate to environmental quality.		
SC.912.L.17.19:	Describe how different natural resources are produced and how their rates of use and renewal limit availability.		
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.		
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.		
	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations: 		
	conduct and record measurements at appropriate levels of precision. Follow safety quidelines)		
	3 Examine books and other sources of information to see what is already known		
	A. Review what is known in light of empirical evidence. (Examine whether available empirical evidence can be interpreted in terms of		
	existing knowledge and models, and if not modify or develop new models).		
	5 Plan investigations. (Design and evaluate a scientific investigation)		
SC.912.N.1.1:	6 Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the		
	generation and interpretation of graphical representations of data including data tables and graphs). (Collect data or evidence in an		
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including		
	set-up, calibration, technique, maintenance, and storage).		
	7. Pose answers, explanations, or descriptions of events.		
	8. Generate explanations that explicate or describe natural phenomena (inferences).		
	9. Use appropriate evidence and reasoning to justify these explanations to others.		
	10. Communicate results of scientific investigations, and		
	11. Evaluate the merits of the explanations produced by others.		
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.		
CO 010 N/1 0	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical		
SC.912.N.1.3:	thinking, and the active consideration of alternative scientific explanations to explain the data presented.		
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.		
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.		
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.		

SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).	
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.	
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.	
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.	
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.	
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.	
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.	
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.	
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.	
SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter.	
SS.912.G.1.1:	Design maps using a variety of technologies based on descriptive data to explain physical and cultural attributes of major world regions. Analyze geographic information from a variety of sources including primary sources, atlases, computer, and digital sources. Geographic Information	
	Systems (GIS), and a broad variety of maps.	
SS.912.G.1.4:	Clarifications: Examples are thematic, contour, and dot-density.	
SS.912.G.3.1:	Use geographic terms to locate and describe major ecosystems of Earth.	
SS.912.G.3.2:	Use geographic terms and tools to explain how weather and climate influence the natural character of a place.	
SS.912.G.3.3:	Use geographic terms and tools to explain differing perspectives on the use of renewable and non-renewable resources in Florida, the United States, and the world	
SS 912 G 3 5·	Use geographic terms and tools to explain how bydrology influences the physical character of a place	
SS.912.G.5.1:	Analyze case studies of how the Earth's physical systems affect humans.	
SS.912.G.5.2:	Analyze case studies of how changes in the physical environment of a place can increase or diminish its capacity to support human activity.	
SS.912.G.5.3:	Analyze case studies of the effects of human use of technology on the environment of places.	
SS.912.G.5.4:	Analyze case studies of how humans impact the diversity and productivity of ecosystems.	
	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. 	
	Ask questions that will help with solving the task.	
	Build perseverance by modifying methods as needed while solving a challenging task.	
	 Stay engaged and maintain a positive mindset when working to solve tasks. 	
	Help and support each other when attempting a new method or approach.	
IVIA.K12.IVITR.1.1:	Clarifications:	
	Teachers who encourage students to participate actively in effortful learning both individually and with others:	
	Cultivate a community of growth mindset learners.	
	Foster perseverance in students by choosing tasks that are challenging.	
	Develop students' ability to analyze and problem solve.	
	Recognize students' effort when solving challenging problems.	
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:	
	Build understanding through modeling and using manipulatives.	
	Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.	
	Progress from modeling problems with objects and drawings to using algorithms and equations.	
	Express connections between concepts and representations.	
MA.K12.MTR.2.1:	Choose a representation based on the given context or purpose.	
	Clarifications:	
	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:	
	Help students make connections between concepts and representations.	
	Provide opportunities for students to use manipulatives when investigating concepts.	
	Guide students from concrete to pictorial to abstract representations as understanding progresses.	
	 Show students that various representations can have different purposes and can be useful in different situations. 	
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:	
	Solect afficient and appropriate methods for colving problems within the given context	
	Maintain flexibility and accuracy while performing procedures and mental calculations	
	Complete tasks accurately and with confidence	
	Adapt procedures to apply them to a new context.	
	Use feedback to improve efficiency when performing calculations.	
	Clarifications:	
	Teachers who encourage students to complete tasks with mathematical fluency:	
	Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.	
	Offer multiple opportunities for students to practice efficient and generalizable methods.	
	• Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.	

	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
MA.K12.MTR.4.1:	 Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Percompise errors and suggest how to correctly solve the task
	 Justify results by explaining methods and processes. Construct possible arguments based on evidence.
	 Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
MA.K12.MTR.5.1:	 Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect colutions of problems to more complicated large code cituations.
	 Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context.
	 Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. * Redesign models and methods to improve accuracy or
	efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning.
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	o-a students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.

ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.	
	Make inferences to support comprehension.	
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.	
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.	
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.	
	Use the accepted rules governing a specific format to create quality work.	
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.	
	Use appropriate voice and tone when speaking or writing.	
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.	
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.	
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.	
HE.912.C.1.3:	Evaluate how environment and personal health are interrelated.	
	Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.	

GENERAL NOTES

This course is designed as an interdisciplinary course to provide students with scientific principles, concepts, and methodologies required to identify and analyze environmental problems and to evaluate risks and alternative solutions for resolving and/or preventing them. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p.3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have skills to aggregate, interpret, and present the resulting data (NRC, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines.

Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards:

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development (ELD) Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

GENERAL INFORMATION	
	Course Path: Section: Grades PreK to 12 Education
Course Number: 2001241	Courses > Grade Group: Grades 9 to 12 and Adult
course Number. 2001341	Education Courses > Subject: Science > SubSubject:
	Environmental Science >
	Abbreviated Title: ENV SCI HON
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
Course Type: Core Academic Course	Course Level: 3
Course Status: State Board Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Educator Certifications

Science (Secondary Grades 7-12)
Biology (Grades 6-12)
Chemistry (Grades 6-12)
Earth/Space Science (Grades 6-12)

Cambridge Pre-AICE Environmental Management IGCSE Level (#2001342) 2019 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-secondary-2/cambridge-igcse/curriculum/.

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2001242	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2001342	Education Courses > Subject: Science > SubSubject:
	Environmental Science >
	Abbreviated Title: PRE-AICE ENV MGMT IG
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Advanced International Certificate of Education
	(AICE)
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	9

Science (Secondary Grades 7-12)	
Chemistry (Grades 6-12)	
Earth/Space Science (Grades 6-12)	
Biology (Grades 6-12)	
Physics (Grades 6-12)	
Earth/Space Science (Secondary Grades 7-12)	

Astronomy Solar/Galactic (#2001350) 2015 - 2022 (current)

Name	Description
SC.912.E.5.6:	Develop logical connections through physical principles, including Kepler's and Newton's Laws about the relationships and the effects of Earth, Moon, and Sun on each other.
SC.912.E.5.7:	Relate the history of and explain the justification for future space exploration and continuing technology development.
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.
SC.912.E.5.9:	Analyze the broad effects of space exploration on the economy and culture of Florida.
SC.912.E.5.11:	Distinguish the various methods of measuring astronomical distances and apply each in appropriate situations.
SC.912.E.6.2:	Connect surface features to surface processes that are responsible for their formation.
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC 012 N 1 2	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical
36.712.14.1.3.	thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
50.912.IN.2.1:	Identify what is science, what clearly is not science, and what superincially resemples science (but rails to meet the chienta for science).
SC.912.N.2.2:	questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.P.8.1:	Differentiate among the four states of matter.
SC.912.P.8.4:	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter.
SC.912.P.10.9:	Describe the quantization of energy at the atomic level.
SC.912.P.10.11:	Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues.

SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.10.19:	Explain that all objects emit and absorb electromagnetic radiation and distinguish between objects that are blackbody radiators and those that are not.
SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.
SC.912.P.10.21:	Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.
SC.912.P.10.22:	Construct ray diagrams and use thin lens and mirror equations to locate the images formed by lenses and mirrors.
SC.912.P.12.2:	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.
SC.912.P.12.4:	Describe how the gravitational force between two objects depends on their masses and the distance between them.
SC.912.P.12.6:	Qualitatively apply the concept of angular momentum.
SC.912.P.12.7:	Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving
LAFS.910.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
LAFS.910.RST.1.2:	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.2.5:	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LAFS.910.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.RST.3.8:	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
LAFS.910.RST.3.9:	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
LAFS.910.RST.4.10:	By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.
	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of
LAFS.910.SL.1.1:	alternate views), clear goals and deadlines, and individual roles as needed.
	incorporate others into the discussion: and clarify verify or challenge ideas and conclusions
	 Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.910.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the taxt, create cohesion, and clarify the relationships between claim(s) and
	 c. Ose words, privates, and blades to link the high sections of the text, or date concestor, and dating the relationships between relating between relating between relationships between rel
LAFS.910.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. e. Establish and maintain a formal style and objective tope while attending to the parent and expression of the discipline in which the use until the parent and expression.
	 Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	
LAFS.910.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	
LAFS.910.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.	
LAFS.910.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	
LAFS.910.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.	
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.	
LAFS.910.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of	
	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★	
MAFS.912.F-IF.3.7:	 a. Graph inhear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift. 	
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★	
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star	
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.	
	Reason abstractly and quantitatively.	
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.	
	Standard Relation to Course: Supporting	
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.	
	Standard Relation to Course: Supporting Model with mathematics.	
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose. Standard Relation to Course: Supporting	
	Use appropriate tools strategically.	
	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper,	

MAFS.K12.MP.5.1:	concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
FLD.K12.FLL.SU.1	English language learners communicate information, lueas and concepts necessary for academic success in the content area of science.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- $\label{eq:constraint} \textbf{4. Emphasizing students supporting answers based upon evidence from the text.}$
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2001350

Number of Credits: One (1) credit Course Type: Elective Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Earth/Space Sciences > Abbreviated Title: ASTRONOMY S/G Course Length: Year (Y) Course Level: 2

Science (Secondary Grades 7-12)
Physics (Grades 6-12)
Earth/Space Science (Grades 6-12)
Middle Grades General Science (Middle Grades 5-9)

Astronomy Solar/Galactic (#2001350) 2022 - And Beyond

Name	Description
SC.912.E.5.6:	Develop logical connections through physical principles, including Kepler's and Newton's Laws about the relationships and the effects of Earth, Moon, and Sun on each other.
SC.912.E.5.7:	Relate the history of and explain the justification for future space exploration and continuing technology development.
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.
SC.912.E.5.9:	Analyze the broad effects of space exploration on the economy and culture of Florida.
SC.912.E.5.11:	Distinguish the various methods of measuring astronomical distances and apply each in appropriate situations.
SC.912.E.6.2:	Connect surface features to surface processes that are responsible for their formation.
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations, or descriptions of events, Generate explanations nor descriptions of events, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC 912 N 1 2	Describe and explain what characterizes science and its methods
56.712.10.1.2.	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical
SC.912.N.1.3:	thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC 912 N 1 5	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.P.8.1:	Differentiate among the four states of matter.
SC.912.P.8.4:	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter.
SC.912.P.10.9:	Describe the quantization of energy at the atomic level.
SC.912.P.10.11:	Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues.

SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.10.19:	Explain that all objects emit and absorb electromagnetic radiation and distinguish between objects that are blackbody radiators and those that are not.
SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.
SC.912.P.10.21:	Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.
SC.912.P.10.22:	Construct ray diagrams and use thin lens and mirror equations to locate the images formed by lenses and mirrors.
SC.912.P.12.2:	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.
SC.912.P.12.4:	Describe how the gravitational force between two objects depends on their masses and the distance between them.
SC.912.P.12.6:	Qualitatively apply the concept of angular momentum.
SC.912.P.12.7:	Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving
MA.K12.MTR.1.1:	 Mathematicians who participate in error turn learning out in hardwadaily and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach. Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems. Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations.
MA.K12.MTR.2.1:	 Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	 Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
	Focus on relevant details within a problem.

MA.K12.MTR.5.1:	 Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts.
	Relate previously learned concepts to new concepts.
	Look for similarities among problems.
	Connect solutions of problems to more complicated large-scale situations.
	Clarifications: Teachers who encourage students to use patterns and structure to belo understand and connect mathematical concepts:
	 Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
	Support students to develop generalizations based on the similarities found among problems.
	Provide opportunities for students to create plans and procedures to solve problems.
	Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
	Estimate to discover possible solutions.
	Use benchmark quantities to determine if a solution makes sense.
	 Check calculations when solving problems. Varify passible solutions by explaining the methods used
MA.K12.MTR.6.1:	 Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
	Clarifications:
	Teachers who encourage students to assess the reasonableness of solutions:
	Have students estimate or predict solutions prior to solving.
	 Prompt students to continually ask, "Does this solution make sense? How do you know?" Deinforce that students check their work as they progress within and after a task.
	 Remore that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real world contexts
	Mathematicians who apply mathematics to real-world contexts:
	Connect mathematical concepts to everyday experiences.
	Use models and methods to understand, represent and solve problems.
	Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or
MA.K12.MTR.7.1:	efficiency.
	Clarifications:
	 Provide opportunities for students to create models, both concrete and abstract, and perform investigations.
	Challenge students to question the accuracy of their models and methods.
	Support students as they validate conclusions by comparing them to the given situation.
	Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing
	2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In
	3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly
	quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide
	referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications:
	See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications:
	girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and
	beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
	Clarifications:
	In kindergarten, students learn to listen to one another respectfully.
	collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills
	Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accented rules governing a specific format to create quality work
	Clarifications:
1	startingerstall.

ELA.K12.EE.5.1:	Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.	
	Use appropriate voice and tone when speaking or writing.	
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.	
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.	
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.	

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2001250

Number of Credits: One (1) credit
Course Type: Elective Course
Course Status: State Board Approved
Grade Level(s): 9 10 11 12

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Earth/Space Sciences > Abbreviated Title: ASTRONOMY S/G Course Length: Year (Y) Course Level: 2

Educator Certifications

Science (Secondary Grades 7-12) Physics (Grades 6-12) Earth/Space Science (Grades 6-12) Middle Grades General Science (Middle Grades 5-9)

International Baccalaureate Environmental Systems and Societies 1 (#2001370) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2001270	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number. 2001370	Education Courses > Subject: Science > SubSubject:
	Environmental Science >
	Abbreviated Title: IB ENV SYS & SOC 1
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	 International Baccalaureate (IB)
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Science (Secondary Grades 7-12)	
Biology (Grades 6-12)	
Chemistry (Grades 6-12)	
Earth/Space Science (Grades 6-12)	

International Baccalaureate Environmental Systems & Societies 2 (#2001375) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2001275	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2001375	Education Courses > Subject: Science > SubSubject:
	Environmental Science >
	Abbreviated Title: IB ENV SYS & SOC 2
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	 International Baccalaureate (IB)
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Science (Secondary Grades 7-12)	
Biology (Grades 6-12)	
Chemistry (Grades 6-12)	
Earth/Space Science (Grades 6-12)	

Advanced Placement Environmental Science (#2001380) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The course description for this Advanced Placement courses is located on the College Board site at http://apcentral.collegeboard.com/apc/public/courses/teachers_corner/index.html.

GENERAL INFORMATION

Course Number: 2001380

Number of Credits: One (1) credit

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Environmental Science > Abbreviated Title: AP ENV SCI Course Length: Year (Y) Course Attributes: • Advanced Placement (AP) Course Level: 3

icience (Secondary Grades 7-12)	
Biology (Grades 6-12)	
Chemistry (Grades 6-12)	
arth/Space Science (Grades 6-12)	

Cambridge AICE Environmental Management AS Level (#2001381) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-advanced/cambridge-international-as-and-alevels/curriculum/.

Course Number:	2001381

Number of Credits: One (1) credit

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Environmental Science > Abbreviated Title: AICE ENV MGMNT AS Course Length: Year (Y) Course Attributes: • Advanced International Certificate of Education (AICE) Course Level: 3

Science (Secondary Grades 7-12)
Biology (Grades 6-12)
Earth/Space Science (Grades 6-12)
Chemistry (Grades 6-12)
Cambridge Pre-AICE Coordinated Science 1 IGCSE Level (#2001390) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-secondary-2/cambridge-igcse/curriculum/.

Course Number 2001200	Course Path: Section: Grades Prek to 12 Education
	Courses > Grade Group: Grades 9 to 12 and Adult
Course Multiber. 2001390	Education Courses > Subject: Science > SubSubject:
	Integrated Sciences >
	Abbreviated Title: PRE-AICE COORSCI 1IG
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Advanced International Certificate of Education
	(AICE)
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Scie	ence

Science (Secondary Grades 7-12)
Biology (Grades 6-12)
Physics (Grades 6-12)
Chemistry (Grades 6-12)

Cambridge Pre-AICE Coordinated Science 2 IGCSE Level (#2001400) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-secondary-2/cambridge-igcse/curriculum/.

Course Number: 2001400	Course Path: Section: Grades Prek to 12 Education
	Courses > Grade Group: Grades 9 to 12 and Adult
	Education Courses > Subject: Science > SubSubject:
	Integrated Sciences >
	Abbreviated Title: PRE-AICE COORSCI 2IG
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Advanced International Certificate of Education
	(AICE)
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous S	Science

Science (Secondary Grades 7-12)	
Biology (Grades 6-12)	
Physics (Grades 6-12)	
Chemistry (Grades 6-12)	

Cambridge Pre-AICE Combined Science IGCSE Level (#2001405) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-secondary-2/cambridge-igcse/curriculum/.

	Course Path: Section: Grades Prek to 12 Education
Course Number: 2001405	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2001405	Education Courses > Subject: Science > SubSubject:
	Integrated Sciences >
	Abbreviated Title: PRE-AICE COMB SCI IG
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Advanced International Certificate of Education
	(AICE)
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Scien	nce

Science (Secondary Grades 7-12)
Biology (Grades 6-12)
Physics (Grades 6-12)
Chemistry (Grades 6-12)

International Baccalaureate Astronomy 2 (#2001810) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2001810	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2001810	Education Courses > Subject: Science > SubSubject:
	Earth/Space Sciences >
	Abbreviated Title: IB ASTRONOMY 2
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	International Baccalaureate (IB)
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Science (Secondary Grades 7-12)	
Physics (Grades 6-12)	
Earth/Space Science (Grades 6-12)	
Middle Grades General Science (Middle Grades 5-9)	

International Baccalaureate Sports Exercise Science 1 (#2001820) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2001820	Courses > Grade Group: Grades 9 to 12 and Adult
course Number: 2001020	Education Courses > Subject: Science > SubSubject:
	Integrated Sciences >
	Abbreviated Title: IB SPORTS EXER SCI 1
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	International Baccalaureate (IB)
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Educator Certifications

Physical Education (Grades 6-12) Physical Education (Elementary and Secondary Grades K-12)

International Baccalaureate Sports Exercise Science 2 (#2001830) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education	
Course Number: 2001830	Courses > Grade Group: Grades 9 to 12 and Adult	
course Number: 2001030	Education Courses > Subject: Science > SubSubject:	
	Integrated Sciences >	
	Abbreviated Title: IB SPORTS EXER SCI 2	
Number of Credits: One (1) credit	Course Length: Year (Y)	
	Course Attributes:	
	International Baccalaureate (IB)	
Course Type: Core Academic Course	Course Level: 3	
Course Status: Course Approved		
Grade Level(s): 9,10,11,12		
Graduation Requirement: Equally Rigorous Science		

Physical Education (Grades 6-12)	
Physical Education (Elementary and Secondary Grades K-12)	

International Baccalaureate Sports Exercise Science 3 (#2001835) 2018 - And Beyond (current)

General Course Information and Notes

VERSION DESCRIPTION

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education	
Course Number: 2001835	Courses > Grade Group: Grades 9 to 12 and Adult	
Course Number. 2001835	Education Courses > Subject: Science > SubSubject:	
	Integrated Sciences >	
	Abbreviated Title: IB SPORTS EXER SCI 3	
Number of Credits: One (1) credit	Course Length: Year (Y)	
	Course Attributes:	
	International Baccalaureate (IB)	
Course Type: Core Academic Course	Course Level: 3	
Course Status: Course Approved		
Grade Level(s): 9,10,11,12		
Graduation Requirement: Equally Rigorous Science		

Physical Education (Grades 6-12)
Physical Education (Elementary and Secondary Grades K-12)
Biology (Grades 6-12)

Experimental Science 1 Honors (#2002340) 2015 - 2022 (current)

Course Standards

Name	Description
LAFS.910.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
LAFS.910.RST.1.2:	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.2.5:	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LAFS.910.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.RST.3.8:	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
LAFS.910.RST.3.9:	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
LAFS.910.RST.4.10:	By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.
LAFS.910.SL.1.1:	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.910.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.910.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).
LAFS.910.WHST.2.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience
LAFS.910.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

LAFS.910.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
LAFS.910.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.910.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.910.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
MAFS.912.F-IF.3.7:	 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star
MAFS.912.S-IC.2.3:	Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each ★
MAFS.912.S-IC.2.6:	Evaluate reports based on data. ★
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting Reason abstractly and guantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others.
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting Model with mathematics.
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting Use appropriate tools strategically.
	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper,

MAFS.K12.MP.5.1:	concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
MAFS.K12.MP.6.1:	Attend to precision. Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
ELD.KT2.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
LLU.IXIZ.LLL.JI.I.	בהקווסה המהקוממקים וכמרחוני 5 כטרוו והטוווטרווכמנים דטר סטומו מדוע וווסנו עכנוטרומו צער צטסים איונדוווד נדוב סטרוטטר 35ננוווק.

GENERAL NOTES

In addition to the course related benchmarks, this course requires additional science content that must include benchmarks from at least one other Body of Knowledge. The additional benchmarks must include rigor appropriate for Level 3 courses. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models
- Planning and carrying out investigations.
- Analyzing and interpreting data
- Using mathematics, information and computer technology, and computational thinking
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The course also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2002340

Number of Credits: One (1) credit

Course Type: Elective Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: EXP SCI 1 HON Course Length: Year (Y) Course Attributes: • Honors Course Level: 3

Educator Certifications

Biology (Grades 6-12) Earth/Space Science (Grades 6-12) Chemistry (Grades 6-12) Physics (Grades 6-12)

Experimental Science 1 Honors (#2002340) 2022 - And Beyond

Course Standards

Name	Description
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships betwee test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC 912 N 1 2	Describe and explain what characterizes science and its methods
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science a they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus a scientific theory represents the most powerful explanation scientists have to offer
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
MA.K12.MTR.1.1:	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach. Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve.
	Recognize students errort when solving challenging problems. Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:
MA.K12.MTR.2.1:	 Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose.
	 Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency.

	Mathematicians who complete tasks with mathematical fluency:
	Select efficient and appropriate methods for solving problems within the given context.
	Maintain flexibility and accuracy while performing procedures and mental calculations.
	Complete tasks accurately and with confidence.
MA.K12.MTR.3.1:	Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations
	Teachers who encourage students to complete tasks with mathematical fluency:
	• Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
	Offer multiple opportunities for students to practice efficient and generalizable methods.
	Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
	Communicate mathematical ideas, vocabulary and methods effectively.
	Analyze the mathematical thinking of others.
	 Compare the efficiency of a method to those expressed by others. Decompise entropy and suggest how to correctly solve the task.
	 Recognize ends and suggest now to conjectly solve the task. Justify results by explaining methods and processes.
MA.K12.MTR.4.1:	Construct possible arguments based on evidence.
	Clarifications:
	Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:
	• Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.
	 Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.
	 Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts.
	Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
	Focus on relevant details within a problem.
	Create plans and procedures to logically order events, steps or ideas to solve problems.
	Decompose a complex problem into manageable parts.
	Relate previously learned concepts to new concepts.
MA.K12.MTR.5.1:	Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations
	Clarifications:
	leachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:
	 Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
	 eachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems.
	 eachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking
	 Heachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	 Heachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
	 Heachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
	 Heachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense.
	 Heachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems.
	 Feachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used.
MA.K12.MTR.6.1:	 Feachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions. Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
MA.K12.MTR.6.1:	 Feachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Terschers who encourage students to access the secons the secons blance of solutions.
MA.K12.MTR.6.1:	 Feachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Haye students estimate or predict solutions prior to solving
MA.K12.MTR.6.1:	 Heachers who encourage students to use patterns and structure to help understand and connect mathematical concepts. Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?"
MA.K12.MTR.6.1:	 Heachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Have students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task.
MA.K12.MTR.6.1:	 Heachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students estimate or predict solutions prior to solving. Prompt students estimate or continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.6.1:	 Heachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.6.1:	 Heachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Have students to assess the reasonableness of solutions: Have students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.6.1:	Ireachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Have students to assess the reasonableness of solutions: Have students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts. Connect mathematical concepts to everyday experiences.
MA.K12.MTR.6.1:	 Iteachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.6.1:	Ireacher's who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students erourage students to assess the reasonableness of solutions: Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students ability to verify solutions through justifications. Apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to inprove accuracy or efficiency. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
MA.K12.MTR.6.1: MA.K12.MTR.7.1:	Iteachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Prompt students to casess the reasonableness of solutions: Have students concurage students to assess the reasonableness of solutions: Agents who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to check their work as they progress within and after a task. Strengthen students doncepts to everyday experiences. Connect mathematical concepts to everyday experiences. Lose models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate, * Redesign models and methods to improve accuracy or efficiency. Clarifications: Clarifications: Automatical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate, * Redesign models and methods to improve accuracy or efficiency.
MA.K12.MTR.6.1: MA.K12.MTR.7.1:	 Iteachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solution makes sense. Check calculations when solving problems. Verify possible solutions when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Prompt students to contend their work as they progress within and after a task. Strengthen students' ability to verify solution strong hjustifications. Apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems.
MA.K12.MTR.6.1: MA.K12.MTR.7.1:	 Iteacers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students chark work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts: Connect mathematics to real-world contexts: Connect mathematics to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Connect mathematics to real-world contexts: Connect mathematics to real-world contexts: Connect mathematics to real-world contexts: Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Provide opportunities for
MA.K12.MTR.6.1: MA.K12.MTR.7.1:	Iteraters who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students eatimate or predict solutions make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations.
MA.K12.MTR.6.1: MA.K12.MTR.7.1:	Ireacers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Restimate to discover possible solutions. Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Prompt students to continually ask, "Does this solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students thek their work as they progress within and after a task. Strengthen students check their work as they progress within and after a task. Strengthen students to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accur
MA.K12.MTR.6.1: MA.K12.MTR.7.1:	 Treacers who encourage students to use patterns and structure to help understand and connect these patterns to mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Evaluate results based on the given context. Clarifications: Prompt students' ability to versity of a solutions prior to solving. Headents ecognize students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts. Apply mathematics to real-world contexts. Use models and methods to understand, represent and solve problems. Use models and methods to understand, represent and solve problems. Use models and methods to understand, represent and solve problems. Evaluations who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate, • Redesign models and methods to improve accuracy or efficiency. Clarifications: Provide opportunities for students to real-world contexts: Provide opportunities for students to real-world contexts:

ELA.K12.EE.1.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing.
	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

In addition to the course related benchmarks, this course requires additional science content that must include benchmarks from at least one other Body of Knowledge. The additional benchmarks must include rigor appropriate for Level 3 courses. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence)

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.

- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2002340

Number of Credits: One (1) credit

Course Type: Elective Course Course Status: State Board Approved Grade Level(s): 9,10,11,12 Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: EXP SCI 1 HON Course Length: Year (Y) Course Attributes: • Honors Course Level: 3

ology (Grades 6-12)	
rth/Space Science (Grades 6-12)	
emistry (Grades 6-12)	
ysics (Grades 6-12)	

Experimental Science 2 Honors (#2002350) 2015 - 2022 (current)

Course Standards

Name	Description
LAFS.910.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
LAFS.910.RST.1.2:	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.2.5:	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LAFS.910.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.RST.3.8:	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
LAFS.910.RST.3.9:	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
LAFS.910.RST.4.10:	By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.
LAFS.910.SL.1.1:	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.910.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.910.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).
LAFS.910.WHST.2.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience
LAFS.910.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

LAFS.910.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.	
LAFS.910.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	
LAFS.910.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.	
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.	
LAFS.910.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	
MAFS.912.F-IF.3.7:	 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift. 	
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★	
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star	
MAFS.912.S-IC.2.3:	Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each ★	
MAFS.912.S-IC.2.6:	Evaluate reports based on data. ★	
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.	
	Standard Relation to Course: Supporting Reason abstractly and guantitatively.	
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.	
	Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others.	
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.	
	Standard Relation to Course: Supporting Model with mathematics.	
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.	
	Standard Relation to Course: Supporting Use appropriate tools strategically.	
	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper,	

MAFS.K12.MP.5.1:	concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting	
MAFS.K12.MP.6.1:	Attend to precision. Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.	
	Standard Relation to Course: Supporting	
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 +$ 9x + 14, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – 3(x – y) ² as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.	
	Standard Relation to Course: Supporting Look for and express regularity in repeated reasoning.	
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.	
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others. 	
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.	
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.	
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.	
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.	
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that th make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.	
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.	
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.	
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.	
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.	
ELD.KT2.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.	
ELU.KIZ.ELL.SI.T.	English language learners communicate for social and instructional purposes within the school setting.	

GENERAL NOTES

In addition to the course related benchmarks, this course requires additional science content that must include benchmarks from at least one other Body of Knowledge. The additional benchmarks must include rigor appropriate for Level 3 courses and should not duplicate additional content addressed in Experimental Science 1. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2002350

Number of Credits: One (1) credit

Course Type: Elective Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: General Sciences > Abbreviated Title: EXP SCI 2 HON Course Length: Year (Y) Course Attributes: • Honors Course Level: 3 Biology (Grades 6-12) Earth/Space Science (Grades 6-12) Chemistry (Grades 6-12) Physics (Grades 6-12)

Experimental Science 2 Honors (#2002350) 2022 - And Beyond

Course Standards

Name	Description		
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships betwee test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and		
SC 912 N 1 2	Describe and explain what characterizes science and its methods		
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.		
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.		
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.		
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.		
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantia range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.		
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.		
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.		
MA.K12.MTR.1.1:	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach. Clarifications: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems. 		
MA.K12.MTR.2.1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations. 		
	Complete tasks with mathematical fluency.		

	wathematicians who complete tasks with mathematical nachey.
	Select efficient and appropriate methods for solving problems within the given context.
	Maintain flexibility and accuracy while performing procedures and mental calculations.
	Complete tasks accurately and with confidence.
MA.K12.MTR.3.1:	Adapt procedures to apply them to a new context.
	Use feedback to improve efficiency when performing calculations.
	Clarifications:
	 Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
	 Offer multiple opportunities for students to practice efficient and generalizable methods.
	Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others.
	Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
	Communicate mathematical ideas, vocabulary and methods effectively.
	Analyze the mathematical thinking of others.
	Compare the efficiency of a method to those expressed by others.
	Recognize errors and suggest how to correctly solve the task.
MA.K12.MTR.4.1:	Justify results by explaining methods and processes.
	Construct possible arguments based on evidence.
	Clarifications:
	 Establish a culture in which students ask questions of the teacher and their neers, and error is an opportunity for learning.
	 Create opportunities for students to discuss their thinking with peers.
	 Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.
	Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts.
	Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
	Focus on relevant details within a problem.
	Create plans and procedures to logically order events, steps or ideas to solve problems.
	Decompose a complex problem into manageable parts.
	Relate previously learned concepts to new concepts.
MA.K12.MTR.5.1:	Look for similarities among problems. Connect colutions of problems to more complicated large code situations
	Connect solutions of problems to more complicated large-scale situations.
	Clarifications: Teachers who encourage students to use patterns and structure to belo understand and connect mathematical concepts:
	Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
	holp stadents recegnize the patterne in the world areand them and connect these patterne to mathematical concepts.
	 Support students to develop generalizations based on the similarities found among problems.
	 Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems.
	 Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	 Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions.
	 Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
	 Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions.
	 Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense.
	 Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Varify presidue optimizes her availability to problems.
MA K12 MTR 6.1:	 Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
MA.K12.MTR.6.1:	 Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
MA.K12.MTR.6.1:	 Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
MA.K12.MTR.6.1:	 Support students to develop generalizations based on the similarit control more problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving.
MA.K12.MTR.6.1:	 Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?"
MA.K12.MTR.6.1:	 Support students to develop generalizations based on the similarities found among problems. Provide opport unities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task.
MA.K12.MTR.6.1:	 Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Have students to assess the reasonableness of solutions are sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.6.1:	 Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students estimate or predict solutions prior to solving. Prompt students estimate or predict solutions prior to solving. Prompt students estimate or predict solutions prior to solving. Prompt students estimate or predict solutions prior to solving. Prompt students estimate or predict solutions prior to solving. Prompt students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts.
MA.K12.MTR.6.1:	 Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Have students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students to continually ask, "Does this solution schemes? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts.
MA.K12.MTR.6.1:	 Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences.
MA.K12.MTR.6.1:	 Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Develop invertigations to an encourage to an encourage the problems.
MA.K12.MTR.6.1:	 Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions between their current understanding and more sophisticated ways of thinking. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students to allotted assess the reasonableness of solutions: Have students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
MA.K12.MTR.6.1: MA.K12.MTR.7.1:	 Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students to certify solutions through justifications. Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. * Redesign models and methods to improve accuracy or efficiency.
MA.K12.MTR.6.1: MA.K12.MTR.7.1:	 Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions. Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations who not solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Prompt students to real-world contexts. Apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate, * Redesign models and methods to improve accuracy or efficiency. Clarifications: Concert mathematical concepts to apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems.
MA.K12.MTR.6.1: MA.K12.MTR.7.1:	 Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
MA.K12.MTR.6.1: MA.K12.MTR.7.1:	 Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students cheat her work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Provide opportunities for students to oreal-world contexts: Provide opportunities for students to apply mathematics to real-world contexts: Provide opportunities for students to appl
MA.K12.MTR.6.1: MA.K12.MTR.7.1:	 Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Athematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations who nassess the reasonableness of solutions: Evaluate results based on the given context. Clarifications: Prompt students to continuelly ask, "Does this solution makes sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' to real-world contexts. Apply mathematics to real-world contexts. Apply mathematics to real-world contexts. Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods.
MA.K12.MTR.6.1: MA.K12.MTR.7.1:	 Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Have students to continually ask, "Does this solution makes sense? How do you know?" Have students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' bo leverify solutions through justifications. Apply mathematical concepts to everyday experiences. Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather to apply mathematics to real-world contexts: Perform investigations to apply mathematics to real-world contexts: Perform investigations to querter to apply mathematics to real-world contexts: Provide opportunities for students to cate models, both concrete and abstract, and perform investigations. Challenge students to apply mathematics to real-world contexts: Provide opportunities for students to cate models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusion

ELA.K12.EE.1.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.	
	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.	
	6-8 Students continue with previous skills and use a style guide to create a proper citation.	
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.	
	Read and comprehend grade-level complex texts proficiently.	
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.	
	Make inferences to support comprehension.	
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.	
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.	
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.	
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.	
	Use the accepted rules governing a specific format to create quality work.	
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.	
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing.	
	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.	
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.	
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.	

GENERAL NOTES

In addition to the course related benchmarks, this course requires additional science content that must include benchmarks from at least one other Body of Knowledge. The additional benchmarks must include rigor appropriate for Level 3 courses and should not duplicate additional content addressed in Experimental Science 1. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.

- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number 2002250	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2002350	Education Courses > Subject: Science > SubSubject:
	General Sciences >
	Abbreviated Title: EXP SCI 2 HON
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
Course Type: Elective Course	Course Level: 3
Course Status: State Board Approved	

Educator Certifications

Grade Level(s): 9,10,11,12

Biology (Grades 6-12)
Earth/Space Science (Grades 6-12)
Chemistry (Grades 6-12)
Physics (Grades 6-12)

Experimental Science 3 Honors (#2002360) 2015 - 2022 (current)

Course Standards

Name	Description	
LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.	
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.	
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.	
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.	
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.	
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.	
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.	
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.	
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.	
LAFS.1112.RST.4.10:	By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.	
LAFS.1112.SL.1.1:	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. 	
	 c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond they apticulate a perspective contraction of the perspective contraction of the perspective contractions. 	
	d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.	
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.	
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.	
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.	
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.	
LAFS.1112.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented. 	
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic). 	
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	

APS 51122401512-0 Considering the strength produce solution and public individual or share soluting products in response to expanse freedome. APS 51122401512-0 Conduct data is well an one solution conserve the policity is any one of the subject and monitorial used and environment or expanse is any other any one of the subject and monitorial used and environment or expanse is any other any one of the subject and environment is any other any one of the subject and monitorial used and environment or expanse is any other any one of the subject and monitorial to expanse is any other any otherany other any other any other any other any oth	LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most	
As 1112 Velocit 2. Consider further and the research process to insever a quarter of the application of the supplication of th	LAFS.1112.WHST.2.6:	significant for a specific purpose and audience. Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information	
Gene reveal information round be adher bittes print and digits course, using abancial sections of theorem into the down of them between the society of the society	LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	
ALS 1112 Wes1 4.0 Desire evidence from informational tests to support analysis relation and research and another time frames (a single stating or a sky or head) for a range of analysis of the support and subjects. ALS 1112 Wes1 4.10 Compti Antimesia Silter for informational research and another time frames (a single stating or a sky or head) for a range of analysis of the support, by hand in single provide range by the single provide range of analysis of the support information. ALS 112 Wes1 4.10 Compti Antimesia Silter for information and show information. BL Compti Antimesia Analysis of the support of the support information. Compti Antimesia Analysis of the support of the	LAFS.1112.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.	
ALS 1112 W151-03 White robusting your extended limits themes (limes) (limits) (limi	LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.	
 a. Caph linesr and quadratic functions, including a networks, magina, and minima. b. Caph approved informations, iterative functions, seturating set functions and about evaluate functions. c. Caph payromid, functions, iterative functions, seturating informations are unable functions, seturating in the approximation functions, iterative generative seturations for factorizations are unabled, and devalue and behavior. d. Caph approximal functions, iterative generative seturations are unabled for factorizations are unabled, and devalue and behavior. e. Caph approximal functions, iterating areas and abit alphaps. * MAS 972 N 0.1.1: Use units as a way to understand problems and to guide the solution of multi-step problems, choose and integrate the scales and the argining agains and with reparting quantities. * MAS 972 SA 0.2.3: Receiptable the purpases of and differences introng samples surveys, experiments, and observational studies: explain how randomization relates to each * MARS 972 SA 0.2.3: Receiptable the purpases of and differences in solving them. MARS 972 SA 0.2.3: Make same of problems and paratives in the integration of a problem and locating for entry points to its solution. They analoy of purposities, not all solution attempts, they consider analogous problems, and thosing points to its solution. They analoy of purposities in adaptions problems, and they special expensions on they graphing abilitation of the parative set of the problem, start by englishing the solution and points and the special expensions on they graphing abilitation of the parative set of the problem in adaptions problems. MARS 872 AM 2.1: In the integraphic problem integraphic problem integraphic problems integraphic problems integraphic problems. MARS 872 AM 2.1: In the integraphic problem integraphic problem integraphic problems. MARS 872 AM 2.1: In their approach integraphing t	LAFS.1112.WHST.4.10:	 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicate cases. ★ 	
MARS 9129-ND 1: Use unlts as a way to understand problems and building in mallistep problems: choose and interpret the science and the argin in graphem and dual displays. * MARS 9128-ND 1: Choose allowed of accuracy appropriate to limitations on measurement when reporting quantifies. * MARS 9128-ND 2: Recognite the purposes of and differences among sample samples, reporting to limitations on measurement when reporting quantifies. * MARS 9128-ND 2: Evaluate reports based on data. * MARS 9128-ND 2: Make sense of problems and persever in solving them. Marks enses of problems and persever in solving them. Make sense of problems and persever in solving them. MARS 9128-ND 2: Make sense of problems and persever in solving them. MARS 9128-ND 2: Make sense of problems and persever in solving them make conjectures about the form and maning of the solution and piper as obtained in the properties of the problem with the solution and piper as obtained in the processes of the problems in solving them in solvin	MAFS.912.F-IF.3.7:	 a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift. 	
MAES 5912.54:2.3 Process level of accuracy appropriate to limitations on measurement when reporting quantities * MAES 5912.54:2.3 Recognize the purposes of and differences among sample surveys, experiments, and observational studies: explain how randomization relates to ack * MAES 5912.51:2.2.6 Evaluate reports based on data * MAES 5812.0M-1.1 Mathematically profilement students tame ty explaining to themselves the meaning of a problems and looking for entry points to its solution and particle students on advance to the programs and charge council magnetize students on advance to programs and charge council magnetize students on advance to programs and charge students and programs of more council of the profilement students can explain carepsocherable students on produce to programs and charge students on advance to produce the second student students can explain carepsocherable produced tables: and graphs or fraw diagrams of imocram to leader solution may explain carepsocherable produced tables: and graphs or fraw diagrams of imocram to leader solution may explain advance to produce students advance the produce students advance advance student advance student advance advance student advance ad	MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★	
AAPS 912 S1C 2.3 Recognize the purposes of and differences among sample surveys, experiments, and observational studies: explain how randomization relates to each. * MAPS 912 S1C 2.6 Evaluate reports based on data: * MAPS 912 S1C 2.6 Evaluate reports based on data: * MAPS 912 S1C 2.6 Evaluate reports based on data: * Maps explaining to the solution and problems and processing, and gains in point and involves the meaning of a problem and looking for entry points to its solution. They analyze gives, constraints, relationships, and gains. They make conjectures about the form and evaluate their progress and single forms of the original problem in order to gain insight in the solution attempts mankor and evaluate their progress and single forms of the original problem in order to gain insight in the solution scale explain correspondences between on their graphing catalities to a solution complex problems and leartify correspondences between other or requiring to the control trong unit problem students check their answers to problems using a different method, and they continually and themselves. "Deve this make sense?" They can understand the approaches of others to solving complex problems and leartify correspondences between different approaches. Standard Relation to Course: Supporting Reason abstractly and quantitatively. MAPS X12 MP 2.1 Mathematically proficient students and key or couple them and lowes and divert reporting somotosity. The provide the complex problems and represent type solving and maxima divert with the solving divert solving the association to course. Supporting MAPS X12 MP 2.1 Mathematically proficient students ande responden	MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star	
MAIS 912.51/2.62 Evaluate reports bised on data * MARE sense of problems and persevere is solving them. Make sense of problems and persevere is solving them. MAIS 912.51/2.24 Make sense of problems and persevere is solving them. MAIS 912.51/2.24 Make sense of problems and persevere is solving them make conjectures about the form and meaning of the solution and pain a solution persever. They innote and evaluate their progress and change course if necessary. Older students and try social cause and simple forms of the problem is transform algobian expressions or change the velong window on their graphing calculator to gate risks and graphs or draw diagrams or high proheting students is solving correcte objects or pictures to help conceptualize and solve a problem. Mathematically proficient students might ray on using ocorrecte objects or pictures to help conceptualize and solve a problem. Mathematically proficient students new respondences between different approaches. Standard Relation to Course: Supporting Reason abstractly and quantitatively. Mathematically proficient students make sense of quantities and their relationships in problem students. They bring two complementary abilities to base on proceens involved and ther expression in our proceens involved and the approaches. Standard Relation to Course: Supporting Mathematically proficient students make sense of quantities and their relationships in problem students. They bring two complementary abilities to relation in the opersenting without a stand asserting on their referents. Mathematically proficient students make sense of quantities and their relationships the abi	MAFS.912.S-IC.2.3:	Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. ★	
Make sense of problems and perseven in solving them. Multi-beneficially proficient students start by specialing to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and pian a solution gathway raiter than simply jumping inhose about to solution. The meaning of the problem in order to be an insight in dissolution. They means conjectures about the form and they special cases and simpler forms of the original proceedings. Solution: They means conjectures about the form and they special cases and simpler forms. Other students in get the information they need Mathematically proficient students can opalian correspondences between equations, where it destinations is using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches. Standard Relation to Course: Supporting Reason abstractly and quantitatively. MAES K12.MP 2.1: Construct Valued senses of quantities and their relationships in problem stuations. They bring two complementary abilities to be proceed in the problem inder the ability for construct many approaches in order to problem in different approaches. MAES K12.MP 2.1: Construct Valued senses of countilities and their relationships. The bring the units includes and persecting granulas in the proceed in the problem stuations. They print the complementary abilities to represent method, and childy up the provide sense of quantities and their relationships. They print the constructing approaches and childy approaches devices in account the ability for corasting accounter the problem in addition to	MAFS.912.S-IC.2.6:	Evaluate reports based on data. ★	
Standard Relation to Course: Supporting MAFS.K12.MP.2.1: Reason abstractly and quantitatively. MAFS.K12.MP.2.1: Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent II symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents — and the ability to contextualize, to puse as needed during the manipulation process in order to probe in to the symbols involved. Quantitative reasoning entalis habts of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects. Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others. Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progession of 3 stamemts to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments hat take into account the context from thick thick flawed, and—if there is a flaw in an argument – explain what it is. Elementary students can construct arguments can make sense and be correct, even though they are not generalized or made formaly until l	MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.	
MAFS.K12.MP.2.1: Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Juantitative reasoning entalis habits of creating a coherent representation of the problem at hand: considering the units involved. attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects. Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others. MaFS.K12.MP.3.1: Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into case, and can recognize and use counterxamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data. making plausible arguments that take into account the context from which the data arose. Authematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument apolations. They make sense, and abs useful questions to cofmat. MAFS.K12.MP.3		Standard Relation to Course: Supporting Reason abstractly and quantitatively.	
Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others. Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguing the mathematics. MAFS.K12.MP.4.1: Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe h	MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.	
MARES.K12.MP.3.1: Mathematically proficient students and contracted the reasoning of others. MARES.K12.MP.3.1: Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments. MARES.K12.MP.4.1: Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might these may need revision later. They are able to identify important quantities in		Standard Relation to Course: Supporting	
Standard Relation to Course: Supporting Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose. Standard Relation to Course: Supporting Use appropriate tools strategically.	MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.	
Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose. Standard Relation to Course: Supporting Use appropriate tools strategically.		Standard Relation to Course: Supporting	
Standard Relation to Course: Supporting Use appropriate tools strategically.	MAFS.K12.MP.4.1:	Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.	
		Standard Relation to Course: Supporting Use appropriate tools strategically.	

MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting Attend to precision	
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.	
	Standard Relation to Course: Supporting	
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.	
	Standard Relation to Course: Supporting	
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.	
SC.912.N.1.1:	 Standard Relation to Course: Supporting Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.	
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.	
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.	
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.	
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.	
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.	
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.	
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.	
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.	
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.	

GENERAL NOTES

In addition to the course related benchmarks, this course requires additional science content that must include benchmarks from at least one other Body of Knowledge. The additional benchmarks must include rigor appropriate for Level 3 courses and should not duplicate additional content addressed in Experimental Science 1 and 2. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.

5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Grade Level(s): 9.10.11.12

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2002240	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2002360	Education Courses > Subject: Science > SubSubject:
	General Sciences >
	Abbreviated Title: EXP SCI 3 HON
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
Course Type: Elective Course	Course Level: 3
Course Status: Course Approved	

Educator Certifications

Biology (Grades 6-12) Earth/Space Science (Grades 6-12) Chemistry (Grades 6-12) Physics (Grades 6-12)

Experimental Science 3 Honors (#2002360) 2022 - And Beyond

Course Standards

Name	Description		
Name SC.912.N.1.1:	 Description Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships betweet test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and		
	11. Evaluate the merits of the explanations produced by others.		
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.		
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.		
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.		
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.		
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.		
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantia		
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.		
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.		
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.		
MA.K12.MTR.1.1:	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach. Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others:		
	 Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems. 		
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:		
MA.K12.MTR.2.1:	 Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. 		
	Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.		
	Complete tasks with mathematical fluency.		

	Mathematicians who complete tasks with mathematical fluency:
	Select efficient and appropriate methods for solving problems within the given context.
	Maintain flexibility and accuracy while performing procedures and mental calculations.
	Complete tasks accurately and with confidence.
MA.K12.MTR.3.1:	Adapt procedures to apply them to a new context.
	Use feedback to improve efficiency when performing calculations.
	Clarifications:
	Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately
	 Offer multiple opportunities for students to practice efficient and generalizable methods.
	Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others.
	Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
	Communicate mathematical ideas, vocabulary and methods effectively.
	Analyze the mathematical thinking of others.
	Compare the efficiency of a method to those expressed by others.
	Recognize errors and suggest how to correctly solve the task.
MA.K12.MTR.4.1:	Justify results by explaining methods and processes.
	Construct possible arguments based on evidence.
	Clarifications:
	Establish a culture in which students ask questions of the teacher and their nears, and error is an opportunity for learning
	 Create opportunities for students to discuss their thinking with peers.
	 Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.
	Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts.
	Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
	Focus on relevant details within a problem.
	Create plans and procedures to logically order events, steps or ideas to solve problems.
	Decompose a complex problem into manageable parts.
	Relate previously learned concepts to new concepts.
MA.K12.MTR.5.1:	Look for similarities among problems. Connect celutions of problems to more complicated large ceale situations
	Connect solutions of problems to more complicated large-scale situations.
	Clarifications: Teachers who encourage students to use patterns and structure to belo understand and connect mathematical concepts:
	 Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
	Support students to develop generalizations based on the similarities found among problems
	 Support students to develop generalizations based on the similarities round among problems.
	 Provide opportunities for students to create plans and procedures to solve problems.
	 Support students to develop generalizations based on the similarities round among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	 Support students to develop generalizations based on the similarities round anong problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions.
	 Support students to develop generalizations based on the similarities round anong problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
	 Support students to develop generalizations based on the similarities round anong problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions.
	 Support students to develop generalizations based on the similarities round anong problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense.
	 Support students to develop generalizations based on the similarities round anong problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems.
MA K12 MTR 6.1:	 Support students to develop generalizations based on the similarities round anong problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
MA.K12.MTR.6.1:	 Support students to develop generalizations based on the similarities round anong problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
MA.K12.MTR.6.1:	 Support students to develop generalizations based on the similarities round anong problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
MA.K12.MTR.6.1:	 Support students to develop generalizations based on the similarities round anong problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving.
MA.K12.MTR.6.1:	 Support students to develop generalizations based on the similarities round anong problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?"
MA.K12.MTR.6.1:	 Support students to develop generalizations based on the similarities round anong problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task.
MA.K12.MTR.6.1:	 Support students to develop generalizations based on the similarities round anticip problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Have students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.6.1:	 Support students to develop generalizations based on the similarities round among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Have students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts.
MA.K12.MTR.6.1:	 Support students to develop generalizations based on the similarities rolle and g in obtents. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts.
MA.K12.MTR.6.1:	 Support students to develop generalizations based on the similarities roland anticing problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Have students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students to real-world contexts. Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. We the mathematical concepts to everyday experiences.
MA.K12.MTR.6.1:	 Depoint students to detend by generalization based on the similarities round and by problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students doet their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts. Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Destrome invertifications to understand, represent and solve problems.
MA.K12.MTR.6.1:	 Depole students to develop generalizations based on the similarities round almong problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Have students to contruct to assess the reasonableness of solutions: Have students to assess the reasonableness of solutions. Kether substanting to assess the reasonableness of solutions: Feachers who encourage students to assess the reasonableness of solutions: Have students continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
MA.K12.MTR.6.1: MA.K12.MTR.7.1:	 Disploit students to develop generalizations based on the similar tites found annoting problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solution makes sense. Check calculations when solving problems. Vselip students' dualities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students due to refly solutions through justifications. Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Chartifications:
MA.K12.MTR.6.1: MA.K12.MTR.7.1:	 Disploit students to develop generalizations based on the similar times found almost problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Prompt students' obtines for assess the reasonableness of solutions: Have students to assess the reasonableness of solutions used. Evaluate results based on the given context. Clarifications: Prompt students' obtines for assess the reasonableness of solutions: Have students to assess the reasonableness of solutions: Areachers who encourage students to assess the reasonableness of solutions: Have students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Eachers who encourage students to apply mathematics to real-world contexts: Eachers who encourage students to apply mathematics to real-world contexts: Eachers who encou
MA.K12.MTR.6.1: MA.K12.MTR.7.1:	 abpoint students to deterping energians and procedures to solve problems. Provide opportunities for students to create plans and procedures to solve problems. bevelop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Have students to assess the reasonableness of solutions: Have students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students to check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate, * Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Proform investigations to gather data or determine if a method is appropriate, * Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to create models, both concrete and abstract, and perform investigations.
MA.K12.MTR.6.1: MA.K12.MTR.7.1:	 Support students to develop students to create plans and procedures to solve problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations who solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students' ability to verify solutions through justifications. Apply mathematics to real-world contexts. Mathematics no real-world contexts. Mathematics and methods to understand, represent and solve problems. Prompt students' ability to verify accuracy or efficiency. Clarificatios: Teachers who encourage students to assess the reasonableness. Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarificatios: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to real-world contexts: Provide opportunities for students to real-world contexts: Provide opportunities for students to reatermine if a method is appropriate. • R
MA.K12.MTR.6.1: MA.K12.MTR.7.1:	 Support students to determine if a methods solution and proceedings. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions. Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Have students or predict solutions prior to solving. Prompt students' ability to verify solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
MA.K12.MTR.6.1: MA.K12.MTR.7.1:	 Support students to berefore particulations based on the similarities found antiolog problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts. Apply mathematics to real-world contexts. Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate, "Redesign models and methods to improve accuracy or efficiency. Clarifications: Provide opportunities to real-world contexts: Provide opportunities to apply mathematics to real-world contexts: Provide opportunities to apply

ELA.K12.EE.1.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing.
	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

In addition to the course related benchmarks, this course requires additional science content that must include benchmarks from at least one other Body of Knowledge. The additional benchmarks must include rigor appropriate for Level 3 courses and should not duplicate additional content addressed in Experimental Science 1 and 2. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.

- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades Prek to 12 Education
Course Number: 2002260	Courses > Grade Group: Grades 9 to 12 and Adult
course number: 2002380	Education Courses > Subject: Science > SubSubject:
	General Sciences >
	Abbreviated Title: EXP SCI 3 HON
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
Course Type: Elective Course	Course Level: 3
Course Status: State Board Approved	

Educator Certifications

Grade Level(s): 9,10,11,12

Biology (Grades 6-12)
Earth/Space Science (Grades 6-12)
Chemistry (Grades 6-12)
Physics (Grades 6-12)

Experimental Science 4 Honors (#2002370) 2015 - 2022 (current)

Course Standards

Name	Description
LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text: summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LAFS.1112.RST.4.10:	By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.
LAFS.1112.SL.1.1:	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11-12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as preseded.
	 c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.1112.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

0.1112/01/01722 Use beforeourg, regulate the behavior to account sublined research provides to a source on the study. International or a sublined research provides the active cardinal sublined research active cardinal sublined research active cardinal sublined research active active cardinal sublined research active cardina	LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most
Als 1112 MHD 3 2 Conduct door is will a more statuted inserved in grack to sover a quantum (reducing a self generated quarted in which any protein statuted in the statute in the statuted in the statuted in the statuted in the statute	LAFS.1112.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
Gene relevant information to multiple submittee prior and light socks, sub-grand analysis submittee in terms with a structure in multiple socks. The structure is multiple socks to a structure is multiple socks. The structure is multiple socks to a structure is multiple socks. The structure is multiple socks to a structure is multiple socks. The structure is multiple sockstocks. The structure is multiple socks. The structure is multiple	LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAS 112 WH61.30 Uncounders and intermediated to be to graph analysis reflection, and resizon LAS 1112 WH61.400 White coulding we calculated into frames (the for reflection and resizon) and outforts the frames (a single status) or a say of too) for a range of disclosing sector tasks proposes, and audiness. Graph Interaction process of the single or status (the property by head in single cases and using technology of the single cases and using technology and the single cases and the single cases and using technology and the single cases and the sin	LAFS.1112.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
GAST 112 WRST 410 The initial bary bar, standard and in the large standard	LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
 a. Capol Inter and quadratic functions and allow intercepts. manual and minima. b. Capol superior cont. University on plexeets-edition functions, including, and disolute value functions. c. Capol payrement functions, identifying arres and anyotice values allow factorizations are available, and disolute value functions. d. Capol nation functions, identifying arres and anyotice values values factorizations are available, and disolute value functions. d. Capol nation functions, identifying arres and anyotice values values factorizations are used in a disolution of multi-step problems. Choose and interpret lunts consistently in formulas: the problems and to guide the solution of multi-step problems. Choose and interpret lunts consistently in formulas: the problems and to guide the solution of multi-step problems. Choose and interpret lunts consistently in formulas: the problems and to array appretication linking more maximum to them experimely appretication. The problems and to guide the solution of multi-step problems. And distribution relates to each. MARS 912-512-52 Mars sprace of pocketing and perseven in solving them. Mars sprace of pocketing and perseven in solving them. Mars sprace of pocketing and perseven in solving them. Mars Skitz MPI 11: MARS Kitz MPI 11: MARS Kitz MPI 11: Mars sprace of pocketing and perseven in solving them. MARS Kitz MPI 11: MARS Kitz M	LAFS.1112.WHST.4.10:	discipline-specific tasks, purposes, and audiences. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★
MRES 912.9.0.1.1 Use unlikes as away to undersidial problems and to gold the southout of multi-step problems: choose and interpret the scale and the orgin in grapps and data deploys. * MRES 912.9.0.2.3 Choose a level of accuracy appropriate to timulators on messurement when reporting quantifies. * MRES 912.9.0.2.4 Recognite the purposes of and differences among samely surveys, experiments, and observational studies: captain how randomization relates to quant. * MRES 912.9.0.2.6 Evaluate reports based on duita. * MRES 812.9.0.2.6 Evaluate reports based on duita. * MRES 812.9.0.2.6 Evaluate reports based on duita. * MRES 812.9.0.1.1 Make sense of problems and persever in solving them. MRES 812.9.0.1.1 Make sense of problems and persever in solving them. MRES 812.9.0.1.1 manualuge dyerang burging into a solution attempt. They cancidar anatogous persons and drange course in the appropriate in the solution and pinal acculation acculation and pinal acculation acculation	MAFS.912.F-IF.3.7:	 a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAES 5912.91.2.13 Choose a level of accuracy appropriate to leminations on measurement where reporting quantities. ★ MAES 912.91.2.2.3 Recognize the purposes of and differences among sample surveys, experiments, and observational studies: explain how randomization relates to exist. ★ MAES 912.91.2.2.6 Evaluate reports based on data. ★ MAES 912.91.2.2 Evaluate reports based on data. ★ MAES 912.91.2.2 Evaluate reports based on data. ★ MAES 812.MP.1.1: Mathematically proficient students and splicitic expensions or danage under some their approach on their approach on their approach or data data based to require some statues and share to require some addition and parts or data data to optimize the information their approach or data data based to require some addition to comes supporting Reason abstractly and quantitatively MAES K12.MP.1.1: Recordinate their existence to their conceptimize and relationships, and and search for requiring the some addition to comes supporting Reason abstractly and quantitatively MAES K12.MP.2.1: Reason abstractly and quantitatively MAES K12.MP.2.1: Reason abstractly and quantitatively increason data bastherelation their relationships in problem in andition co	MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. \star
MMIS 912 5 IC 2.8 Recognize the purposes of and differences among sample surveys, experiments, and observational studies, explain how madomization relates to each. * MMIS 912 5 IC 2.6 Evaluate regords based on data. * MMIS 912 5 IC 2.6 Evaluate regords based on data. * MMIS 912 5 IC 2.6 Evaluate regords based on data. * MMIS 912 5 IC 2.6 Evaluate regords based on data. * MMIS 912 5 IC 2.6 Evaluate regords based on data. * MMIS 912 5 IC 2.6 Evaluate regords based on data. * MMIS 912 5 IC 2.6 Evaluate regords based on data. * MMIS 912 5 IC 2.6 Evaluate regords based on data in the problem. The solution They mental reasons and regords and charge counter and the solution and plants available on pathogs and the problem. Therefore the process and charge counter and the solution to their properties and the proceed material solution. They mental reasons and regords and regords and charge to their solution. They mental solution to their properties to their solution. They mental solution is the solution to their properties in the solution of their coll the problem. Therefore, their solution is the properiment solution. They bring the complex problems and identity contractic solution. They mental plant dependent solution and plant solution and plant solution and plant solution and plant solution. They bring the complex problems and identity complex problems. They complex problems and identity complex plant solution and plant solution an	MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★
MMTS 912.51C2.6: Evaluate reports based on data * Make sense of problems and persevere in solving them. Make sense of problems and persevere in solving them. Make sense of problems and persevere in solving them. Mathematically proficient students start by explaining to themselves the meaning of a problem and locking for entry points to its solution. They analyze givens, constraints, relationships, and guals. They make conjectures about the form and meaning of the solution and plan a solution partway relate than simply jumping hos a solution attempt. They crandels and/puscip problems and change course if necessary. Older students in right, depending on the course of the profilent transform algebraic expressions or change the viewing window on their graphing calculator to get a draw dagmas of important fastures and relationships, graph data, and search for requestry or transform sleptone equations, verbal descriptions, tables, and graphs or draw dagmas of budy they contangle systems and relationships, range data, and search for requestry or transform algebraic expressions or change the viewing windows their asprosches of others to solving complex proteins and identify correspondences between different approaches. Standard Relation to Course: Supporting Reason abstractly and quantitative instantionships the ability to decorrestutized — abistract agiven situation. They pering two complexentary abilities, to construct viable arguments and critique the reasoning of their relationships in order in problem at hand, considering the window dated and the amalpaloin process in order to problem. Maris K12.MP.2.1 Mathematically proficient students and changes and manipulation process in order to problem the approaches. Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of their relationships in ability or content utage the evaluation in the processent is symbolicity. Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of their solutis and co	MAFS.912.S-IC.2.3:	Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. ★
Make sense of problems and perseven in solving them. Make sense of problems and perseven in solving them. Make sense of problems and perseven in solving them. Make sense of problems and perseven in solving them. Make sense of problems and perseven in solving them. Make sense of problems and perseven in solving them. MAES.K12.MP-1.1 Mathematically prodient inservice the gain imagin line is solution. They monitor and evaluate their progress and change course if necessary. Older students and the inservice option componence between equations. Inselve and realisons is solution. They monitor and evaluate their progress and change course if necessary. Older students and realisonships, argan data, and search for reaging window on their solutions tables, and progress to draw dargarse of the problems individually correspondences between equations. Sheek helm answers to problems using a different method, and they contributive solution they contributive they on using contributive problems and identify correspondences between different approaches. Standard Relation to Course. Supporting Reason astractly and quantitatively. MAES.K12.MP 2.1: Reason astracting anohere trepesonalism of their son, which are dessarily attending to the ability for control which and the option shall disting to the meaning of these on the option shall disting to the meaning of these on, which are dessarily attending to the ability for control which and the option process in order to problem shutching the ability for control which and the option shall disting to the meaning of these on, which the data set of theability for control which and the ability for control which and th	MAFS.912.S-IC.2.6:	Evaluate reports based on data. *
Standard Relation to Course: Supporting MAFS.K12.MP.2.1: Reason abstractly and quantitatively. MAFS.K12.MP.2.1: Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize-to abstract a given situation and represent its ymbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to puse as needed during the manipulation process in order to probe in to the referents for the symbols involved. Quantitative relationships and flexibly using different properties of operations and objects. Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1: Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progesion of 3 statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments for abuncas of others. They reason inductively about data marking plausible arguments has take into account the context from which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents Surfavings, diagrams, and actions. Such arguments are make sense and be correct, even though they are not generalized or made formaly until later grades. Later, students learn to determine domains	MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS K12.MP.2.1: MAFS K12.MP.3.1: MAFS K12.MP.4.1: MAFS K12.MP.		Standard Relation to Course: Supporting Reason abstractly and quantitatively.
Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others. Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the argurgents, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation. In middle grades, a student might ap	MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1: Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments. MAFS.K12.MP.4.1: Standard Relation to Course: Supporting MAFS.K12.MP.4.1: Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a functin to describe how one quantity of interest depends on another. Ma		Standard Relation to Course: Supporting
Standard Relation to Course: Supporting Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose. Standard Relation to Course: Supporting Use appropriate tools strategically.	MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1: MAFS.K		Standard Relation to Course: Supporting
Standard Relation to Course: Supporting Use appropriate tools strategically.	MAFS.K12.MP.4.1:	Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
		Standard Relation to Course: Supporting Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting Attend to precision.	
------------------	--	
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.	
	Standard Relation to Course: Supporting	
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.	
	Standard Relation to Course: Supporting	
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.	
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others. 	
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.	
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.	
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.	
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.	
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.	
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena: thus, a scientific theory represents the most powerful explanation scientists have to offer	
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.	
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.	
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.	

н

GENERAL NOTES

In addition to the course related benchmarks, this course requires additional science content that must include benchmarks from at least one other Body of Knowledge. The additional benchmarks must include rigor appropriate for Level 3 courses and should not duplicate additional content addressed in Experimental Science 1, 2 and 3. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.

5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering)
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Grade Level(s): 9.10.11.12

	Course Path: Section: Grades PreK to 12 Education	
Course Number: 2002270	Courses > Grade Group: Grades 9 to 12 and Adult	
Course Number: 2002370	Education Courses > Subject: Science > SubSubject:	
	General Sciences >	
	Abbreviated Title: EXP SCI 4 HON	
Number of Credits: One (1) credit	Course Length: Year (Y)	
	Course Attributes:	
	Honors	
Course Type: Elective Course	Course Level: 3	
Course Status: Course Approved		

Educator Certifications

Biology (Grades 6-12) Earth/Space Science (Grades 6-12) Chemistry (Grades 6-12) Physics (Grades 6-12)

Experimental Science 4 Honors (#2002370) 2022 - And Beyond

Course Standards

Name	Description		
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships betwee test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and		
SC 912 N 1 2	Describe and explain what characterizes science and its methods		
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.		
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.		
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.		
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.		
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantia range of phenomena; thus a scientific theory represents the most powerful explanation scientists have to offer		
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.		
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.		
MA.K12.MTR.1.1:	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach. Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Develop students' ability to analyze and problem solve. 		
MA.K12.MTR.2.1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. 		
	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. 		
	 Help students who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations. 		
	Complete tasks with mathematical fluency.		

	Mathematicians who complete tasks with mathematical fluency:
	Select efficient and appropriate methods for solving problems within the given context.
	Maintain flexibility and accuracy while performing procedures and mental calculations.
	Complete tasks accurately and with confidence.
MA.K12.MTR.3.1:	 Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations
	Teachers who encourage students to complete tasks with mathematical fluency:
	• Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
	Offer multiple opportunities for students to practice efficient and generalizable methods.
	Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
	Communicate mathematical ideas, vocabulary and methods effectively.
	Analyze the mathematical thinking of others.
	Compare the efficiency of a method to those expressed by others.
	Recognize errors and suggest now to correctly solve the task.
MA.K12.MTR.4.1:	Construct possible arguments based on evidence.
	Clarifications:
	Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:
	• Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.
	 Create opportunities for students to discuss their thinking with peers. Select, acquiance and present student work to advance and deepen understanding of correct and increasingly officient methods.
	 Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use nations and structure to help understand and connect mathematical concents
	Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
	Focus on relevant details within a problem.
	 Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts.
	Relate previously learned concepts to new concepts.
	Look for similarities among problems.
MA.K12.MTR.5.1:	Connect solutions of problems to more complicated large-scale situations.
	Clarifications:
	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:
	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems.
	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems.
	 Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	 Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions. • Estimate to discover possible solutions.
	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense.
	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions. • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems.
MA V12 NATE 4 1.	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used.
MA.K12.MTR.6.1:	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context.
MA.K12.MTR.6.1:	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions:
MA.K12.MTR.6.1:	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Levaluate results based on the given context.
MA.K12.MTR.6.1:	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?"
MA.K12.MTR.6.1:	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continuelly ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task.
MA.K12.MTR.6.1:	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.6.1:	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students to oreal-world contexts. Apply mathematics to real-world contexts.
MA.K12.MTR.6.1:	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Heve students evalues to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students to real-world contexts: • Connect mathematics to real-world contexts:
MA.K12.MTR.6.1:	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Heve students evalues to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems.
MA.K12.MTR.6.1:	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: + Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-worid contexts:
MA.K12.MTR.6.1: MA.K12.MTR.7.1:	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. Clarifications: • Have students estimate or predict solutions prior to solving. • Prompt students atometry ability to verify solutions through justifications. • Alare students atometry ability to verify solutions through justifications. • Have students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications. Apply mathemati
MA.K12.MTR.6.1: MA.K12.MTR.7.1:	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Have students extinate or predict solutions prior to solving. • Prompt students check their work as they progress within and after a task. • Strengthen students' check their work as they progress within and after a task. • Strengthen students' do understand, represent and solve problems. • Connect mathematics to real-world contexts:
MA.K12.MTR.6.1: MA.K12.MTR.7.1:	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Verity possible solutions by explaining the methods used. • Verity possible solutions by explaining the methods used. • Verity possible solutions by explaining the methods used. • Verity possible solutions by explaining the methods used. • Have students encourage students to assess the reasonableness of solutions: • Have students or continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' to real-world contexts. Mathematicians who apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts. Develop thast u
MA.K12.MTR.6.1: MA.K12.MTR.7.1:	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Verify possible solutions by explaining the methods used. • Verify possible solutions by explaining the methods used. • Verify possible solutions by explaining the methods used. • Verify possible solutions proto to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts. Mathe
MA.K12.MTR.6.1: MA.K12.MTR.7.1:	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support Students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models
MA.K12.MTR.6.1:	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students develop generalizations based on the similarities found among problems. Support students of develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions. Assess the reasonableness of solutions. • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Have students continually ask, "Does this solution make sense? How do you know?" • Reinforce that students able and methods to real-world contexts. Apply mathematics to real-world contexts. • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a m

ELA.K12.EE.1.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing.
	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

In addition to the course related benchmarks, this course requires additional science content that must include benchmarks from at least one other Body of Knowledge. The additional benchmarks must include rigor appropriate for Level 3 courses and should not duplicate additional content addressed in Experimental Science 1, 2 and 3. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.

- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades Prek to 12 Education	
Course Number: 2002270	Courses > Grade Group: Grades 9 to 12 and Adult	
course Number: 2002370	Education Courses > Subject: Science > SubSubject:	
	General Sciences >	
	Abbreviated Title: EXP SCI 4 HON	
Number of Credits: One (1) credit	Course Length: Year (Y)	
	Course Attributes:	
	Honors	
Course Type: Elective Course	Course Level: 3	
Course Status: State Board Approved		

Educator Certifications

Grade Level(s): 9,10,11,12

Biology (Grades 6-12)
Earth/Space Science (Grades 6-12)
Chemistry (Grades 6-12)
Physics (Grades 6-12)

Integrated Science 1 (#2002400) 2015 - 2022 (current)

Name	Description		
SC.912.E.5.1:	Cite evidence used to develop and verify the scientific theory of the Big Bang (also known as the Big Bang Theory) of the origin of the universe.		
SC.912.E.5.2:	Identify patterns in the organization and distribution of matter in the universe and the forces that determine them.		
SC.912.E.5.4:	Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth.		
SC.912.E.5.7:	Relate the history of and explain the justification for future space exploration and continuing technology development.		
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.		
SC.912.E.6.1:	Describe and differentiate the layers of Earth and the interactions among them.		
SC.912.E.6.2:	Connect surface features to surface processes that are responsible for their formation.		
SC.912.E.6.3:	Analyze the scientific theory of plate tectonics and identify related major processes and features as a result of moving plates.		
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.		
SC.912.E.7.3:	Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.		
SC.912.L.14.1:	Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.		
SC.912.L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).		
SC.912.L.14.3:	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.		
SC.912.L.14.4:	Compare and contrast structure and function of various types of microscopes.		
SC.912.L.14.7:	Relate the structure of each of the major plant organs and tissues to physiological processes.		
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.		
SC.912.L.15.4:	Describe how and why organisms are hierarchically classified and based on evolutionary relationships.		
SC.912.L.15.5:	Explain the reasons for changes in how organisms are classified.		
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.		
SC.912.L.15.8:	Describe the scientific explanations of the origin of life on Earth.		
SC.912.L.16.1:	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.		
SC.912.L.16.14:	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.		
SC.912.L.16.16:	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.		
SC.912.L.16.17:	Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation.		
SC.912.L.17.2:	Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.		
SC.912.L.17.3:	Discuss how various oceanic and freshwater processes, such as currents, tides, and waves, affect the abundance of aquatic organisms.		
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.		
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.		
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.		
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.		
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.		
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.		
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.		
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.		
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: 1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).		
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between		
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;		
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).		
	3. Examine books and other sources of information to see what is already known,		
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of		
	existing knowledge and models, and if not, modify or develop new models).		
	5. Plan investigations, (Design and evaluate a scientific investigation).		
SC.912.N.1.1:	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the		
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an		
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including		
	set-up, calibration, technique, maintenance, and storage).		
	7. Pose answers, explanations, or descriptions of events,		
	8. Generate explanations that explicate or describe natural phenomena (inferences),		
	9. Use appropriate evidence and reasoning to justify these explanations to others,		
	10. Communicate results of scientific investigations, and		
	11. Evaluate the merits of the explanations produced by others.		

SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.P.8.1:	Differentiate among the four states of matter.
SC.912.P.8.2:	Differentiate between physical and chemical properties and physical and chemical changes of matter.
SC.912.P.8.3:	Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes were necessitated by experimental evidence.
SC.912.P.8.4:	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC.912.P.8.5:	Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.
SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.4:	states of matter.
SC.912.P.10.7:	Distinguish between endothermic and exothermic chemical processes.
SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.
SC.912.P.12.3:	Interpret and apply Newton's three laws of motion.
LAFS.910.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
LAFS.910.RST.1.2:	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.2.5:	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LAFS.910.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.RST.3.8:	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
LAFS.910.RST.3.9:	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
LAFS.910.RST.4.10:	By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.
	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision making (on a linformal expressions taking votes on key issues, presentation of the set rules for collegial discussions and decision making (on a linformal expression).
LAFS.910.SL.1.1:	alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively
	incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
	Write arguments focused on discipline-specific content.
	a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear
	relationships among the claim(s), counterclaims, reasons, and evidence.
	b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s)

LAFS.910.WHST.1.1:	 c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented. 	
LAFS.910.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic). 	
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	
LAFS.910.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	
LAFS.910.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.	
LAFS.910.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	
LAFS.910.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.	
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.	
LAFS.910.WHST.4.10:	Write routinely over extended time trames (time for reflection and revision) and shorter time trames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★	
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star	
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.	
	Reason abstractly and quantitatively.	
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.	
	Standard Relation to Course: Supporting	
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.	
	Standard Relation to Course: Supporting Model with mathematics	
	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In	
	early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem	

MAFS.K12.MP.4.1:	or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results. Standard Relation to Course: Supporting
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course	Number:	2002400
000.00		2002.000

Number of Credits: One (1) credit

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Integrated Sciences > Abbreviated Title: INTEG SCI 1 Course Length: Year (Y) Course Attributes: • Class Size Core Required Course Level: 2

Earth/Space Science (Grades 6-12)
Physics (Grades 6-12)
Science (Secondary Grades 7-12)
Biology (Grades 6-12)
Viddle Grades General Science (Middle Grades 5-9)
Chemistry (Grades 6-12)

Integrated Science 1 (#2002400) 2022 - And Beyond

Name	Description		
SC.912.E.5.1:	Cite evidence used to develop and verify the scientific theory of the Big Bang (also known as the Big Bang Theory) of the origin of the universe.		
SC.912.E.5.2:	Identify patterns in the organization and distribution of matter in the universe and the forces that determine them.		
SC.912.E.5.4:	Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth.		
SC.912.E.5.7:	Relate the history of and explain the justification for future space exploration and continuing technology development.		
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.		
SC.912.E.6.1:	Describe and differentiate the layers of Earth and the interactions among them.		
SC.912.E.6.2:	Connect surface features to surface processes that are responsible for their formation.		
SC.912.E.6.3:	Analyze the scientific theory of plate tectonics and identify related major processes and features as a result of moving plates.		
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.		
SC.912.E.7.3:	Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.		
SC.912.L.14.1:	Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.		
SC.912.L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).		
SC.912.L.14.3:	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.		
SC.912.L.14.4:	Compare and contrast structure and function of various types of microscopes.		
SC.912.L.14.7:	Relate the structure of each of the major plant organs and tissues to physiological processes.		
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.		
SC.912.L.15.4:	Describe how and why organisms are hierarchically classified and based on evolutionary relationships.		
SC.912.L.15.5:	Explain the reasons for changes in how organisms are classified.		
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.		
SC.912.L.15.8:	Describe the scientific explanations of the origin of life on Earth.		
SC.912.L.16.1:	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.		
SC.912.L.16.14:	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.		
SC.912.L.16.16:	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.		
SC.912.L.16.17:	Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation.		
SC.912.L.17.2:	Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.		
SC.912.L.17.3:	Discuss how various oceanic and freshwater processes, such as currents, tides, and waves, affect the abundance of aquatic organisms.		
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.		
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.		
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.		
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.		
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.		
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.		
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.		
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.		
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: 1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).		
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between		
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;		
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).		
	3. Examine books and other sources of information to see what is already known,		
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of		
	existing knowledge and models, and if not, modify or develop new models).		
SC 912 N 1 1	 Plan investigations, (Design and evaluate a scientific investigation). (Les table to estimate and interment data (this includes the use of management in matrix and other surfaces and also the 		
56.712.10.1.1.	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the		
	generation and interpretation of graphical representations of data, including data tables and graphs), (collect data of evidence in an		
	organized way. Fropeny use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set up calibration technique, maintenance, and storage).		
	7 Pose answers, evilantions, or descriptions of events		
	8. Generate evolutions that evolutions or describe natural phonomena (inferences)		
	9. Use appropriate evidence and reasoning to justify these explanations to others		
	10. Communicate results of scientific investigations and		
	11. Evaluate the merits of the explanations produced by others		
1			

1			
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.		
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.		
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.		
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.		
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.		
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).		
SC 912 N 3 1	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial		
00.712.14.0.11	range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.		
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.		
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.		
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.		
SC.912.P.8.1:	Differentiate among the four states of matter.		
SC.912.P.8.2:	Differentiate between physical and chemical properties and physical and chemical changes of matter.		
SC.912.P.8.3:	explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes were necessitated by experimental evidence.		
SC.912.P.8.4:	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.		
SC.912.P.8.5:	Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.		
SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.		
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.		
SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter		
SC 912 P 10 7	Distinguish between endothermic and evothermic chemical processes		
36.712.1.10.7.	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves		
SC.912.P.10.20:	from one medium to another.		
SC.912.P.12.3:	Interpret and apply Newton's three laws of motion.		
	Mathematicians who participate in effortful learning both individually and with others:		
	Analyze the problem in a way that makes sense given the task.		
	Ask questions that will help with solving the task.		
	Build perseverance by modifying methods as needed while solving a challenging task.		
	 Stay engaged and maintain a positive mindset when working to solve tasks. 		
	Help and support each other when attempting a new method or approach.		
WIA.K12.WITR.1.1:	Clarifications:		
	Teachers who encourage students to participate actively in effortful learning both individually and with others:		
	Cultivate a community of growth mindset learners.		
	Foster perseverance in students by choosing tasks that are challenging.		
	Develop students' ability to analyze and problem solve.		
	Recognize students' effort when solving challenging problems.		
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:		
	Duild understanding through modeling and using manipulatives		
	Dunid understanding through modeling and using manipulatives. Depresent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.		
	Represent solutions to problems with objects and drawings to using algorithms and equations.		
	Express connections between concepts and representations.		
MA.K12.MTR.2.1:	 Choose a representation based on the given context or purpose. 		
	Clarifications		
	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:		
	Help students make connections between concepts and representations.		
	Provide opportunities for students to use manipulatives when investigating concepts.		
	Guide students from concrete to pictorial to abstract representations as understanding progresses.		
	Show students that various representations can have different purposes and can be useful in different situations.		
	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:		
	Select efficient and appropriate methods for solving problems within the given context.		
	Maintain nexibility and accuracy while performing procedures and mental calculations.		
	Adapt procedures to apply them to a pew context		
MA.K12.MTR.3.1:	Use feedback to improve efficiency when performing calculations.		
	Teachers who encourage students to complete tasks with mathematical fluency.		
	Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately		
	Offer multiple opportunities for students to practice efficient and generalizable methods.		
	Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.		
	Engage in discussions that reflect on the mathematical thinking of self and others.		
	Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:		

	 Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Institution of the processor. 	
MA.K12.MTR.4.1:	 Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers. 	
MA.K12.MTR.5.1:	 Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts. Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.	
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task.	
MA.K12.MTR.7.1:	 Strengthen students ability to verify solutions through justifications. Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines. 	
ELA.K12.EE.1.1:	 Indicate how valious concepts can be applied to other disciplines. Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. 	
FLA.K12.FF.2.1:	Read and comprehend grade-level complex texts proficiently.	

	See Text Complexity for grade-level complexity bands and a text complexity rubric.	
	Make inferences to support comprehension.	
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.	
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.	
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.	
	Use the accepted rules governing a specific format to create quality work.	
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.	
	Use appropriate voice and tone when speaking or writing.	
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.	
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.	
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.	

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills.

To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2002400

Number of Credits: One (1) credit

Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Integrated Sciences > Abbreviated Title: INTEG SCI 1 Course Length: Year (Y) Course Attributes: • Class Size Core Required Course Level: 2

arth/Space Science (Grades 6-12)
hysics (Grades 6-12)
cience (Secondary Grades 7-12)
iology (Grades 6-12)
liddle Grades General Science (Middle Grades 5-9)
hemistry (Grades 6-12)

Integrated Science 1 Honors (#2002410) 2015 - 2022 (current)

Name	Description		
SC.912.E.5.1:	Cite evidence used to develop and verify the scientific theory of the Big Bang (also known as the Big Bang Theory) of the origin of the universe.		
SC.912.E.5.2:	Identify patterns in the organization and distribution of matter in the universe and the forces that determine them.		
SC.912.E.5.4:	Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth.		
SC.912.E.5.7:	Relate the history of and explain the justification for future space exploration and continuing technology development.		
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.		
SC.912.E.6.1:	Describe and differentiate the layers of Earth and the interactions among them.		
SC.912.E.6.2:	Connect surface features to surface processes that are responsible for their formation.		
SC.912.E.6.3:	Analyze the scientific theory of plate tectonics and identify related major processes and features as a result of moving plates.		
SC.912.E.6.6:	Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies.		
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.		
SC.912.E.7.3:	Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.		
SC.912.L.14.1:	Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.		
SC.912.L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).		
SC.912.L.14.4:	Compare and contrast structure and function of various types of microscopes.		
SC.912.L.14.7:	Relate the structure of each of the major plant organs and tissues to physiological processes.		
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.		
SC.912.L.15.4:	Describe how and why organisms are hierarchically classified and based on evolutionary relationships.		
SC.912.L.15.5:	Explain the reasons for changes in how organisms are classified.		
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.		
SC.912.L.15.8:	Describe the scientific explanations of the origin of life on Earth.		
SC.912.L.16.1:	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.		
SC 0121 16 14	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining		
30.912.L.10.14.	chromosome number during asexual reproduction. Describe the process of mejosis, including independent assortment and crossing over. Explain how reduction division results in the formation of		
SC.912.L.16.16:	haploid gametes or spores.		
SC.912.L.16.17:	variation.		
SC.912.L.17.2:	Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.		
SC.912.L.17.3:	Discuss how various oceanic and freshwater processes, such as currents, tides, and waves, affect the abundance of aquatic organisms.		
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.		
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.		
SC.912.L.17.10:	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.		
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.		
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.		
SC.912.L.17.19:	Describe how different natural resources are produced and how their rates of use and renewal limit availability.		
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.		
SC.912.L.18.2:	Describe the important structural characteristics of monosaccharides, disaccharides, and polysaccharides and explain the functions of carbohydrates in living things.		
SC.912.L.18.3:	Describe the structures of fatty acids, triglycerides, phospholipids, and steroids. Explain the functions of lipids in living organisms. Identify some reactions that fatty acids undergo. Relate the structure and function of cell membranes.		
SC.912.L.18.4:	Describe the structures of proteins and amino acids. Explain the functions of proteins in living organisms. Identify some reactions that amino acids undergo. Relate the structure and function of enzymes.		
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.		
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.		
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.		
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.		
	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). 		
CO 010 N 1 1	5. Plan investigations, (Design and evaluate a scientific investigation).		
SC.912.N.1.1:	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the		

	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	set-up, calibration, technique, maintenance, and storage).
	7. Pose answers, explanations, or descriptions of events,
	8. Generate explanations that explicate or describe natural phenomena (inferences),
	9. Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
CO 010 N 1 0	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical
SC.912.N.1.3:	thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.
	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and
SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger,
	leading to its durability.
SC 912 N 2 5	Describe instances in which scientists varied backgrounds, talents, interests, and goals innuence the interences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as
30.712.14.2.3.	they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those
SC.912.N.3.3:	relationships.
CC 012 N 2 4	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported
50.912.10.3.4:	descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as
	human, economic, and environmental.
SC.912.P.8.1:	Differentiate among the four states of matter.
SC.912.P.8.2:	Differentiate between physical and chemical properties and physical and chemical changes of matter.
SC.912.P.8.3:	Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes were precessiteted by experimental evidence.
	we're necessitaled by experimental evidence.
SC.912.P.8.4:	and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC.912.P.8.5:	Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.
SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
00 010 D 10 1	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or
SC.912.P.10.4:	states of matter.
SC.912.P.10.7:	Distinguish between endothermic and exothermic chemical processes.
SC.912.P.10.8:	Explain entropy's role in determining the efficiency of processes that convert energy to work.
SC 912 P 10 19	Explain that all objects emit and absorb electromagnetic radiation and distinguish between objects that are blackbody radiators and those that are
00.712.1110.177	not.
SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves
	from one medium to another.
SC.912.P.12.3:	Interpret and apply Newton's three laws of motion.
SC.912.P.12.7:	Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are
SC 012 D 12 8	Thomas a the second sec
SC 012 D 12 0	Recognize that time, length, and energy depend on the frame of reference.
56.712.1.12.7.	For a function that models a relationship between two quantities interpret key features of graphs and tables in terms of the quantities and sketch
MAFS.912.F-IF.2.4;	graphs showing key features given a verbal description of the relationship. Key features include: intercepts: intervals where the function is increasing.
	decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. ★
	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated
	cases. ★
	a Granh linear and quadratic functions and show intercents maxima and minima
	 b. Graph initial and quadratic relations and show intercepts, maxima, and minima.
MAFS.912.F-IF.3.7:	c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior
	d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.
	e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and
	amplitude, and using phase shift.
MAFS.912.G-MG.1.2:	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas;
	Choose and interpret the scale and the origin in graphs and data displays. *
MAES 012 NI VAL 1 2	Solve problems involving velocity and other quantities that can be represented by vectors
ΜΔΕς 912 C IC 2 4	Evaluate reports based on data
10.71 0.712.010.2.0.	Evaluato reporta based officiala. A

	Represent data with plots on the real number line (dot plots, histograms, and box plots). ★		
MAFS.912.S-ID.1.1:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.		
	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. \star		
MAFS.912.S-ID.1.2:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.		
	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). ★		
MAFS.912.S-ID.1.3:	S-ID.1.3: Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.		
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. \star		
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joi marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. ★		
MAFS.912.S-ID.2.6:	 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association. 		
	Clarifications: Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.		
	Make sense of problems and persevere in solving them.		
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually as themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.		
	Standard Relation to Course: Supporting		
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of		
	quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.		
	Construct viable arguments and critique the reasoning of others.		
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.		
	Standard Relation to Course: Supporting Model with mathematics		
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.		

	Standard Relation to Course: Supporting
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
MAFS.K12.MP.7.1:	Evok for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression x^2 + 9x + 14, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y. Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
LAFS.910.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
LAFS.910.RST.1.2:	an accurate summary of the text.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.2.5:	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LAFS.910.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words
LAFS.910.RST.3.8:	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical
LAFS.910.RST.3.9:	problem. Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or
LAFS.910.RST.4.10:	contradict previous explanations or accounts. By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.
LAFS.910.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and

	examples appropriate to the audience's knowledge of the topic.		
LAFS.910.WHST.1.2:	c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts.		
	d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.		
	e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.		
	f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).		
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.		
LAFS.910.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.		
LAFS.910.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.		
LAFS.910.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation		
LAFS.910.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.		
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.		
LAFS.910.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.		
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.		
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.		

GENERAL NOTES

While the content focus of this course is consistent with the Integrated Science 1 course, students will explore these concepts in greater depth. In general, the academic pace and rigor will be greatly increased for honors level course work. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and

concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION	
Course Number: 2002410	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Integrated Sciences >
Number of Credits: One (1) credit	Abbreviated Title: INTEG SCI 1 HON Course Length: Year (Y) Course Attributes: • Honors • Class Size Core Required
Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science	Course Level: 3

Earth/Space Science (Grades 6-12)
Physics (Grades 6-12)
Science (Secondary Grades 7-12)
Biology (Grades 6-12)
Middle Grades General Science (Middle Grades 5-9)
Chemistry (Grades 6-12)

Integrated Science 1 Honors (#2002410) 2022 - And Beyond

Name	Description
SC.912.E.5.1:	Cite evidence used to develop and verify the scientific theory of the Big Bang (also known as the Big Bang Theory) of the origin of the universe.
SC.912.E.5.2:	Identify patterns in the organization and distribution of matter in the universe and the forces that determine them.
SC.912.E.5.4:	Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth.
SC.912.E.5.7:	Relate the history of and explain the justification for future space exploration and continuing technology development.
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.
SC.912.E.6.1:	Describe and differentiate the layers of Earth and the interactions among them.
SC.912.E.6.2:	Connect surface features to surface processes that are responsible for their formation.
SC.912.E.6.3:	Analyze the scientific theory of plate tectonics and identify related major processes and features as a result of moving plates.
SC.912.E.6.6:	Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies.
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
SC.912.E.7.3:	Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.
SC.912.L.14.1:	Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.
SC.912.L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).
SC.912.L.14.4:	Compare and contrast structure and function of various types of microscopes.
SC.912.L.14.7:	Relate the structure of each of the major plant organs and tissues to physiological processes.
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.
SC.912.L.15.4:	Describe how and why organisms are hierarchically classified and based on evolutionary relationships.
SC.912.L.15.5:	Explain the reasons for changes in how organisms are classified.
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
SC.912.L.15.8:	Describe the scientific explanations of the origin of life on Earth.
SC.912.L.16.1:	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.
SC 0121 16 14	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining
30.712.L.10.14.	chromosome number during asexual reproduction.
SC.912.L.16.16:	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.
SC.912.L.16.17:	Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation.
SC.912.L.17.2:	Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.
SC.912.L.17.3:	Discuss how various oceanic and freshwater processes, such as currents, tides, and waves, affect the abundance of aquatic organisms.
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.17.10:	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.
SC.912.L.17.19:	Describe how different natural resources are produced and how their rates of use and renewal limit availability.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.2:	Describe the important structural characteristics of monosaccharides, disaccharides, and polysaccharides and explain the functions of carbohydrates in living things.
SC.912.L.18.3:	Describe the structures of fatty acids, triglycerides, phospholipids, and steroids. Explain the functions of lipids in living organisms. Identify some reactions that fatty acids undergo. Relate the structure and function of cell membranes.
SC.912.L.18.4:	Describe the structures of proteins and amino acids. Explain the functions of proteins in living organisms. Identify some reactions that amino acids undergo. Relate the structure and function of enzymes.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: 1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). 2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	 Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models).
	5. Plan investigations, (Design and evaluate a scientific investigation).
SC.912.N.1.1:	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the

	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	set-up, calibration, technique, maintenance, and storage).
	Pose answers, explanations, or descriptions or events, Secondary and the explanations that explicate or describe natural phenomena (inferences)
	9 Use appropriate evidence and reasoning to justify these explanations to others.
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.8.1:	Differentiate among the four states of matter.
SC.912.P.8.2:	Differentiate between physical and chemical properties and physical and chemical changes of matter.
SC.912.P.8.3:	Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes were necessitated by experimental evidence.
SC.912.P.8.4:	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC.912.P.8.5:	Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.
SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter.
SC.912.P.10.7:	Distinguish between endothermic and exothermic chemical processes.
SC.912.P.10.8:	Explain entropy's role in determining the efficiency of processes that convert energy to work.
SC.912.P.10.19:	Explain that all objects emit and absorb electromagnetic radiation and distinguish between objects that are blackbody radiators and those that are not.
SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.
SC.912.P.12.3:	Interpret and apply Newton's three laws of motion.
SC.912.P.12.7:	Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving.
SC.912.P.12.8:	Recognize that Newton's Laws are a limiting case of Einstein's Special Theory of Relativity at speeds that are much smaller than the speed of light.
SC.912.P.12.9:	Recognize that time, length, and energy depend on the frame of reference.
	Mathematicians who participate in effortful learning both individually and with others:
	Analyze the problem in a way that makes sense given the task.
	Ask questions that will help with solving the task.
	Build perseverance by modifying methods as needed while solving a challenging task.
	 Stay engaged and maintain a positive mindset when working to solve tasks. Using and support each other when attempting a new method or approach.
MA.K12.MTR.1.1:	 Help and support each other when attempting a new method or approach.
	Clarifications:
	Cultivate a community of growth mindset learners
	Foster perseverance in students by choosing tasks that are challenging
	 Develop students' ability to analyze and problem solve.
	Recognize students' effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:
	Ruild understanding through modeling and using manipulatives
	 Build driver standing through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.

	 Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations.
MA.K12.MTR.2.1:	Choose a representation based on the given context or purpose.
	 Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency.
MA.K12.MTR.3.1:	 Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others.
MA.K12.MTR.4.1:	 Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence.
	Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts. Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences.

MA.K12.MTR.7.1:	 Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
	Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
ELA.K12.EE.1.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELA.K12.EE.6.1: ELD.K12.ELL.SC.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts. English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.

GENERAL NOTES

While the content focus of this course is consistent with the Integrated Science 1 course, students will explore these concepts in greater depth. In general, the academic pace and rigor will be greatly increased for honors level course work. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGl/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2002410	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2002410	Education Courses > Subject: Science > SubSubject:
	Integrated Sciences >
	Abbreviated Title: INTEG SCI 1 HON
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
	Class Size Core Required
Course Type: Core Academic Course	Course Level: 3
Course Status: State Board Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Se	cience

rth/Space Science (Grades 6-12)
ysics (Grades 6-12)
ience (Secondary Grades 7-12)
ology (Grades 6-12)
ddle Grades General Science (Middle Grades 5-9)
nemistry (Grades 6-12)

International Baccalaureate Mid Years Prog Integrated Science (#2002415) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2002/15	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2002415	Education Courses > Subject: Science > SubSubject:
	Integrated Sciences >
	Abbreviated Title: IB MYP INTEG SCI
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	 International Baccalaureate (IB)
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

cience (Secondary Grades 7-12)	
Aiddle Grades General Science (Middle Grades 5-9)	
hemistry (Grades 6-12)	
Siology (Grades 6-12)	
hysics (Grades 6-12)	
arth/Space Science (Grades 6-12)	

Integrated Science 2 (#2002420) 2015 - 2022 (current)

Name	Description
SC.912.E.5.3:	Describe and predict how the initial mass of a star determines its evolution.
SC.912.E.5.5:	Explain the formation of planetary systems based on our knowledge of our Solar System and apply this knowledge to newly discovered planetary systems.
SC.912.E.5.6:	Develop logical connections through physical principles, including Kepler's and Newton's Laws about the relationships and the effects of Earth, Moon, and Sun on each other.
SC.912.E.7.4:	Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans.
SC.912.E.7.7:	Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.14.26:	Identify the major parts of the brain on diagrams or models.
SC.912.L.14.36:	Describe the factors affecting blood flow through the cardiovascular system.
SC.912.L.14.52:	Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.
SC.912.L.15.8:	Describe the scientific explanations of the origin of life on Earth.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.16.1:	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.16.3:	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.9:	Explain how and why the genetic code is universal and is common to almost all organisms.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.13:	Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.
SC.912.L.16.16:	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.
SC.912.L.16.17:	Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.
SC.912.L.18.10:	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and

SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.P.8.6:	Distinguish between bonding forces holding compounds together and other attractive forces, including hydrogen bonding and van der Waals forces.
SC.912.P.8.8:	Characterize types of chemical reactions, for example: redox, acid-base, synthesis, and single and double replacement reactions.
SC.912.P.8.9:	Apply the mole concept and the law of conservation of mass to calculate quantities of chemicals participating in reactions.
SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.
SC.912.P.8.12:	Describe the properties of the carbon atom that make the diversity of carbon compounds possible.
SC.912.P.8.13:	Identify selected functional groups and relate how they contribute to properties of carbon compounds.
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.
SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).
SC.912.P.10.12:	Differentiate between chemical and nuclear reactions.
SC.912.P.10.14:	Differentiate among conductors, semiconductors, and insulators.
SC.912.P.10.15:	Investigate and explain the relationships among current, voltage, resistance, and power.
SC.912.P.12.1:	Distinguish between scalar and vector quantities and assess which should be used to describe an event.
SC.912.P.12.2:	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.
SC.912.P.12.4:	Describe how the gravitational force between two objects depends on their masses and the distance between them.
LAFS.910.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
LAFS.910.RST.1.2:	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.2.5:	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LAFS.910.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.RST.3.8:	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
LAFS.910.RST.3.9:	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
LAFS.910.RST.4.10:	By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.
LAFS.910.SL.1.1:	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the oxidons and responded.
LAES 010 SL 1 2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and
LAES 010 SL 1 2	accuracy of each source. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted
LAFS.910.5L.1.3:	evidence. Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the
LAF5.910.3L.2.4:	organization, development, substance, and style are appropriate to purpose, audience, and task. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of
LAFS.910.SL.2.5:	findings, reasoning, and evidence and to add interest.
LAFS.910.WHST.1.1:	 a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

LAFS.910.WHST.1.2:	 b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts.
	 d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. e. Establish and maintain a formal style and objective tope while attending to the porms and conventions of the discipline in which they are writing.
	 f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.910.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.910.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
LAFS.910.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each
LAFS.910.WHST.3.8:	source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.910.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
MAFS.912.N-VM.1.3:	Solve problems involving velocity and other quantities that can be represented by vectors. Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
MAFS.K12.MP.3.1:	Construct viable arguments and critique the reasoning of others. Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting Model with mathematics.
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting
	use appropriate tools strategically.
	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools

MAFS.K12.MP.5.1:	might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
HE.912.C.1.3:	Evaluate how environment and personal health are interrelated.
	Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
HE.912.C.1.5:	Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases.
	Clarifications: Health prevention, detection, and treatment of: breast and testicular cancer, suicide, obesity, and industrial-related chronic disease.
HE.912.C.1.7:	Analyze how heredity and family history can impact personal health.
	Clarifications: Drug use, family obesity, heart disease, mental health, and non-communicable illness or disease.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2002420

Number of Credits: One (1) credit

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Educator Certifications

Earth/Space Science (Grades 6-12) Physics (Grades 6-12) Science (Secondary Grades 7-12) Biology (Grades 6-12) Chemistry (Grades 6-12) Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Integrated Sciences > Abbreviated Title: INTEG SCI 2 Course Length: Year (Y) Course Attributes: • Class Size Core Required Course Level: 2

Integrated Science 2 (#2002420) 2022 - And Beyond

Name	Description
SC.912.E.5.3:	Describe and predict how the initial mass of a star determines its evolution.
SC.912.E.5.5:	Explain the formation of planetary systems based on our knowledge of our Solar System and apply this knowledge to newly discovered planetary systems.
SC.912.E.5.6:	Develop logical connections through physical principles, including Kepler's and Newton's Laws about the relationships and the effects of Earth, Moon, and Sun on each other.
SC.912.E.7.4:	Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans.
SC.912.E.7.7:	Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.14.26:	Identify the major parts of the brain on diagrams or models.
SC.912.L.14.36:	Describe the factors affecting blood flow through the cardiovascular system.
SC.912.L.14.52:	Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.
SC.912.L.15.8:	Describe the scientific explanations of the origin of life on Earth.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.16.1:	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.16.3:	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.9:	Explain how and why the genetic code is universal and is common to almost all organisms.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.13:	Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.
SC.912.L.16.16:	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.
SC.912.L.16.17:	Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.
SC.912.L.18.10:	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and

SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they
SC.912.N.2.5:	make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.P.8.6:	Distinguish between bonding forces holding compounds together and other attractive forces, including hydrogen bonding and van der Waals forces.
SC.912.P.8.8:	Characterize types of chemical reactions, for example: redox, acid-base, synthesis, and single and double replacement reactions.
SC.912.P.8.9:	Apply the mole concept and the law of conservation of mass to calculate quantities of chemicals participating in reactions.
SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.
SC.912.P.8.12:	Describe the properties of the carbon atom that make the diversity of carbon compounds possible.
SC.912.P.8.13:	Identify selected functional groups and relate how they contribute to properties of carbon compounds.
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.
SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).
SC.912.P.10.12:	Differentiate between chemical and nuclear reactions.
SC.912.P.10.14:	Differentiate among conductors, semiconductors, and insulators.
SC.912.P.10.15:	Investigate and explain the relationships among current, voltage, resistance, and power.
SC.912.P.12.1:	Distinguish between scalar and vector quantities and assess which should be used to describe an event.
SC.912.P.12.2:	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.
SC.912.P.12.4:	Describe how the gravitational force between two objects depends on their masses and the distance between them.
	Mathematicians who participate in effortful learning both individually and with others:
	Anaryze the problem in a way that makes sense given the task.
	Ask questions that will help with solving the task.
	Build perseverance by modifying methods as needed while solving a challenging task.
	 Stay engaged and maintain a positive mindset when working to solve tasks. Using and support cosh other when attempting a new method or enpression.
MA.K12.MTR.1.1:	Heip and support each other when attempting a new method or approach.
	Clarifications:
	l eachers who encourage students to participate actively in effortful learning both individually and with others:
	Cultivate a community of growth mindset learners.
	Foster perseverance in students by choosing tasks that are challenging.
	Develop students' ability to analyze and problem solve.
	Recognize students' effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways.
	Mathematicians who demonstrate understanding by representing problems in multiple ways:
	Build understanding through modeling and using manipulatives.
	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
	 Progress from modeling problems with objects and drawings to using algorithms and equations.
	Express connections between concepts and representations.
MA.K12.MTR.2.1:	Choose a representation based on the given context or purpose.
	Clarifications
	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:
	Help students make connections between concepts and representations.
	 Provide opportunities for students to use manipulatives when investigating concepts.
	Guide students from concrete to pictorial to abstract representations as understanding progresses.
	 Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with methamatical fluores:
MA.K12.MTR.3.1:	Mathematicians who complete tasks with mathematical fluency:
	Salact afficient and appropriate methods for solving problems within the given context
	Maintain flevibility and accuracy while performing procedures and mental calculations
	Complete tasks accurately and with confidence
	Adapt procedures to apply them to a pew context
	Ise feedback to improve efficiency when performing calculations
	Clarifications:
	Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately
	Offer multiple opportunities for students to practice efficient and generalizable methods
	 Oner maniple opportunities for students to practice encient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used
	Engage in discussions that reflect on the mathematical thinking of self and others
	Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
	Communicate mathematical ideas, vocabulary and methods effectively.
	Analyze the mathematical thinking of others.
	Compare the efficiency of a method to those expressed by others.
	Recognize errors and suggest how to correctly solve the task.
MA.K12.MTR.4.1:	 Justify results by explaining methods and processes.
	Construct possible arguments based on evidence.
	Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
------------------	---
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
MA.K12.MTR.5.1:	 Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations.
	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
	Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts:
	 Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
MA.K12.M1R.7.1:	Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
ELA V12 EE 1 1.	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.N 12.EE.1.1.	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.

ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
	Evaluate how environment and personal health are interrelated.
HE.912.C.1.3:	Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
HE.912.C.1.5:	Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases.
	Clarifications: Health prevention, detection, and treatment of: breast and testicular cancer, suicide, obesity, and industrial-related chronic disease.
HE.912.C.1.7:	Analyze how heredity and family history can impact personal health.
	Clarifications: Drug use, family obesity, heart disease, mental health, and non-communicable illness or disease.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2002420

Number of Credits: One (1) credit

Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Integrated Sciences > Abbreviated Title: INTEG SCI 2 Course Length: Year (Y) Course Attributes: • Class Size Core Required Course Level: 2

arth/Space Science (Grades 6-12)
hysics (Grades 6-12)
cience (Secondary Grades 7-12)
iology (Grades 6-12)
hemistry (Grades 6-12)

Name	Description
SC.912.E.5.3:	Describe and predict how the initial mass of a star determines its evolution.
SC 912 E 5 5	Explain the formation of planetary systems based on our knowledge of our Solar System and apply this knowledge to newly discovered planetary
56.712.E.5.5.	systems.
SC.912.E.5.6:	Develop logical connections through physical principles, including Kepler's and Newton's Laws about the relationships and the effects of Earth, Moon, and Sun on each other.
SC.912.E.7.2:	Analyze the causes of the various kinds of surface and deep water motion within the oceans and their impacts on the transfer of energy between the poles and the equator.
SC.912.E.7.4:	Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans.
SC.912.E.7.7:	Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.
SC.912.L.14.5:	Explain the evidence supporting the scientific theory of the origin of eukaryotic cells (endosymbiosis).
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.14.7:	Relate the structure of each of the major plant organs and tissues to physiological processes.
SC.912.L.14.26:	Identify the major parts of the brain on diagrams or models.
SC.912.L.14.27:	Identify the functions of the major parts of the brain, including the meninges, medulla, pons, midbrain, hypothalamus, thalamus, cerebellum and cerebrum.
SC.912.L.14.52:	Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.16.1:	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.16.3:	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.7:	Describe how viruses and bacteria transfer genetic material between cells and the role of this process in biotechnology.
SC.912.L.16.9:	Explain how and why the genetic code is universal and is common to almost all organisms.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC 912 16 12	Describe how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and
56.712.E.10.12.	transformation) is used to construct recombinant DNA molecules (DNA cloning).
SC.912.L.16.13:	Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.
SC.912.L.16.14:	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.
SC.912.L.16.16:	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.
SC.912.L.16.17:	Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.17.10:	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.
SC.912.L.18.10:	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:
	1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
SC 012 N 1 1	5. Plan investigations, (Design and evaluate a scientific investigation).
30.912.N.1.1:	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	set-up, calibration, technique, maintenance, and storage).

	7. Pose answers, explanations, or descriptions of events,
	8. Generate explanations that explicate or describe natural phenomena (inferences),
	9. Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	1. Evaluate the merits of the explanations produced by others.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.
	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and
SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientifics have to offer.
SC 012 D 8 6	Distinguish batween bonding forces bolding compounds together and other attractive forces, including bydrogen bonding and van der Waals forces
SC 912 P 8 8	Characterize types of chemical reactions for example: redox, acid-base, synthesis, and single and double replacement reactions
SC.912.P.8.9:	Apply the mole concept and the law of conservation of mass to calculate guantities of chemicals participating in reactions.
SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.
SC.912.P.8.12:	Describe the properties of the carbon atom that make the diversity of carbon compounds possible.
SC.912.P.8.13:	Identify selected functional groups and relate how they contribute to properties of carbon compounds.
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.
SC.912.P.10.6:	Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum.
SC.912.P.10.9:	Describe the quantization of energy at the atomic level.
SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).
SC.912.P.10.12:	Differentiate between chemical and nuclear reactions.
SC.912.P.10.14:	Differentiate among conductors, semiconductors, and insulators.
SC.912.P.10.15:	Investigate and explain the relationships among current, voltage, resistance, and power.
SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.
SC.912.P.10.21:	Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.
SC.912.P.10.22:	Construct ray diagrams and use thin lens and mirror equations to locate the images formed by lenses and mirrors.
SC.912.P.12.1:	Distinguish between scalar and vector quantities and assess which should be used to describe an event.
SC.912.P.12.2:	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.
SC.912.P.12.4:	Describe how the gravitational force between two objects depends on their masses and the distance between them.
SC.912.P.12.11:	Describe phase transitions in terms of kinetic molecular theory.
SC.912.P.12.12:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.
LAFS.910.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
LAFS.910.RST.1.2:	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.2.5:	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LAFS.910.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.RST.3.8:	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem
LAFS.910.RST.3.9:	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contrastict providers available to a second
LAES 010 DST / 10-	By the and of grade 10, read and comprehend science/technical texts in the grades $9-10$ text complexity hand independently and proficiently
LAI 3.7 10.K31.4.10.	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of
LAFS.910.SL.1.1:	alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.
	d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

LAFS.910.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.910.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.910.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.910.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.910.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
LAFS.910.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.910.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.910.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i> ★ Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated
MAFS.912.F-IF.3.7:	 cases. ★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.G-MG.1.2:	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. \star
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star
MAFS.912.N-VM.1.3: MAFS.912.S-IC 2.6	Solve problems involving velocity and other quantities that can be represented by vectors. Evaluate reports based on data. ★
IVIAE2.412.2-IC.2.6:	Represent data with plots on the real number line (dot plots, histograms, and box plots). ★
MAFS.912.S-ID.1.1:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ★
MAFS.912.S-ID.1.2:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). ★
MAFS.912.S-ID.1.3:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.

MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.
MAFS.912.S-ID.2.6:	 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association.
	Clarifications: Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting
MAFS.K12.MP.4.1:	Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
	own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful

MAFS.K12.MP.6.1:	about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
	Evaluate how environment and personal health are interrelated.
HE.912.C.1.3:	Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
	Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases.
HE.912.C.1.5:	Clarifications: Health prevention, detection, and treatment of: breast and testicular cancer, suicide, obesity, and industrial-related chronic disease.
	Analyze how heredity and family history can impact personal health.
HE.912.C.1.7:	Clarifications: Drug use, family obesity, heart disease, mental health, and non-communicable illness or disease.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

While the content focus of this course is consistent with the Integrated Science 2 course, students will explore these concepts in greater depth. In general, the academic pace and rigor will be greatly increased for honors level course work. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.

- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education	
Course Number: 2002420	Courses > Grade Group: Grades 9 to 12 and Adult	
Course Number: 2002430	Education Courses > Subject: Science > SubSubject:	
	Integrated Sciences >	
	Abbreviated Title: INTEG SCI 2 HON	
Number of Credits: One (1) credit	Course Length: Year (Y)	
	Course Attributes:	
	Honors	
	Class Size Core Required	
Course Type: Core Academic Course	Course Level: 3	
Course Status: Course Approved		
Grade Level(s): 9,10,11,12		
Graduation Requirement: Equally Rigorous Science		

arth/Space Science (Grades 6-12)
hysics (Grades 6-12)
cience (Secondary Grades 7-12)
iology (Grades 6-12)
hemistry (Grades 6-12)

Name	Description
SC.912.E.5.3:	Describe and predict how the initial mass of a star determines its evolution.
SC.912.E.5.5:	Explain the formation of planetary systems based on our knowledge of our Solar System and apply this knowledge to newly discovered planetary systems.
SC.912.E.5.6:	Develop logical connections through physical principles, including Kepler's and Newton's Laws about the relationships and the effects of Earth, Moon, and Sun on each other.
SC.912.E.7.2:	Analyze the causes of the various kinds of surface and deep water motion within the oceans and their impacts on the transfer of energy between the poles and the equator.
SC.912.E.7.4:	Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans.
SC.912.E.7.7:	Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.
SC.912.L.14.5:	Explain the evidence supporting the scientific theory of the origin of eukaryotic cells (endosymbiosis).
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.14.7:	Relate the structure of each of the major plant organs and tissues to physiological processes.
SC.912.L.14.26:	Identify the major parts of the brain on diagrams or models.
SC.912.L.14.27:	Identify the functions of the major parts of the brain, including the meninges, medulla, pons, midbrain, hypothalamus, thalamus, cerebellum and cerebrum.
SC.912.L.14.52:	Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.16.1:	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.16.3:	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.7:	Describe how viruses and bacteria transfer genetic material between cells and the role of this process in biotechnology.
SC.912.L.16.9:	Explain how and why the genetic code is universal and is common to almost all organisms.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.12:	Describe how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and transformation) is used to construct recombinant DNA molecules (DNA cloning).
SC.912.L.16.13:	Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.
SC.912.L.16.14:	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.
SC.912.L.16.16:	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.
SC.912.L.16.17:	Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.17.10:	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.
SC.912.L.18.10:	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:
	1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	 Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models).
	5. Plan investigations, (Design and evaluate a scientific investigation).
SC.912.N.1.1:	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage).

	7. Pose answers, explanations, or descriptions of events,
	8. Generate explanations that explicate or describe natural phenomena (inferences),
	9. Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.
SC 012 N 2 4	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger
55.712.14.2.1.	leading to its durability.
SC 912 N 3 1	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial
	range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.P.8.6:	Distinguish between bonding forces holding compounds together and other attractive forces, including hydrogen bonding and van der Waals forces.
SC.912.P.8.8:	Apply the mole concept and the law of conservation of mass to calculate quantities of chemicals participating in reactions.
SC 912 P 8 11	Relate acidity and hasicity to bydronium and bydroxyl ion concentration and pH
SC 912 P 8 12	Describe the properties of the carbon atom that make the diversity of carbon compounds possible
SC.912.P.8.13:	Identify selected functional groups and relate how they contribute to properties of carbon compounds.
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.
SC.912.P.10.6:	Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum.
SC.912.P.10.9:	Describe the quantization of energy at the atomic level.
SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).
SC.912.P.10.12:	Differentiate between chemical and nuclear reactions.
SC.912.P.10.14:	Differentiate among conductors, semiconductors, and insulators.
SC.912.P.10.15:	Investigate and explain the relationships among current, voltage, resistance, and power.
SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves
CC 010 D 10 01	from one medium to another.
SC.912.P.10.21:	Construct ray diagrams and use thin long and mirror equations to locate the images formed by longes and mirrors.
SC 912 P 12 1	Distinguish between scalar and vector quantities and assess which should be used to describe an event
SC 912 P 12 2	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time
SC.912.P.12.4:	Describe how the gravitational force between two objects depends on their masses and the distance between them.
SC.912.P.12.11:	Describe phase transitions in terms of kinetic molecular theory.
SC.912.P.12.12:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.
	Mathematicians who participate in effortful learning both individually and with others:
	Analyze the problem in a way that makes sense given the task.
	 Ask questions that will help with solving the task.
	 Build perseverance by modifying methods as needed while solving a challenging task.
	 Stay engaged and maintain a positive mindset when working to solve tasks.
MA K12 MTR 1 1	 Help and support each other when attempting a new method or approach.
NU GICI 2.101110.1.1.	Clarifications:
	Teachers who encourage students to participate actively in effortful learning both individually and with others:
	Cuitivate a community of growth mindset learners. Easter perseverance in students by cheesing tasks that are shellenging
	 Develop students' ability to analyze and problem solve
	Recognize students' effort when solving challenging problems
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:
	Build understanding through modeling and using manipulatives
	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
	 Progress from modeling problems with objects and drawings to using algorithms and equations.
	Express connections between concepts and representations.
MA.K12.MTR.2.1:	Choose a representation based on the given context or purpose.
	Clarifications:
	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:
	Help students make connections between concepts and representations.
	Provide opportunities for students to use manipulatives when investigating concepts.
	Guide students from concrete to pictorial to abstract representations as understanding progresses.
	Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:
	 Select encient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations.
	Complete tasks accurately and with confidence.
	Adapt procedures to apply them to a new context.
MA.K12.MTR.3.1:	Use feedback to improve efficiency when performing calculations.
1	· · · · ·

	Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used. Engage in discussions that reflect on the mathematical thinking of self and others.
MA.K12.MTR.4.1:	 Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	 Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	 Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide

	referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
HE.912.C.1.3:	Evaluate how environment and personal health are interrelated.
	Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
HE.912.C.1.5:	Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases.
	Clarifications: Health prevention, detection, and treatment of: breast and testicular cancer, suicide, obesity, and industrial-related chronic disease.
HE.912.C.1.7:	Analyze how heredity and family history can impact personal health.
	Clarifications: Drug use, family obesity, heart disease, mental health, and non-communicable illness or disease.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

While the content focus of this course is consistent with the Integrated Science 2 course, students will explore these concepts in greater depth. In general, the academic pace and rigor will be greatly increased for honors level course work. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- $\label{eq:constraint} \textbf{4. Emphasizing students supporting answers based upon evidence from the text.}$
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION	
	Course Path: Section: Grades PreK to 12 Education
Course Number: 2002430	Courses > Grade Group: Grades 9 to 12 and Adult
	Education Courses > Subject: Science > SubSubject:
	Integrated Sciences >
	Abbreviated Title: INTEG SCI 2 HON
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
	Class Size Core Required
Course Type: Core Academic Course	Course Level: 3
Course Status: State Board Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

th/Space Science (Grades 6-12)	
ysics (Grades 6-12)	
ence (Secondary Grades 7-12)	
logy (Grades 6-12)	
emistry (Grades 6-12)	

Integrated Science 3 (#2002440) 2015 - 2022 (current)

Name	Description
SC.912.E.5.9:	Analyze the broad effects of space exploration on the economy and culture of Florida.
SC.912.E.6.4:	Analyze how specific geologic processes and features are expressed in Florida and elsewhere.
SC.912.E.7.6:	Relate the formation of severe weather to the various physical factors.
SC.912.E.7.8:	Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually and collectively.
SC.912.E.7.9:	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
SC.912.L.15.10:	Identify basic trends in hominid evolution from early ancestors six million years ago to modern humans, including brain size, jaw size, language, and manufacture of tools.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.15.14:	Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.8:	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.13:	Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.
SC.912.L.17.5:	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.
SC.912.L.17.6:	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
SC.912.L.18.10:	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
SC.912.N.1.1:	 Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).

SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and
SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.8.10:	Describe oxidation-reduction reactions in living and non-living systems.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.
SC.912.P.10.3:	Compare and contrast work and power qualitatively and quantitatively.
SC.912.P.10.6:	Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum.
SC.912.P.10.9:	Describe the quantization of energy at the atomic level.
SC.912.P.10.11:	Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues.
SC.912.P.10.16:	Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and electric fields, and their application to modern technologies.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.10.21:	Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.
SC.912.P.10.22:	Construct ray diagrams and use thin lens and mirror equations to locate the images formed by lenses and mirrors.
SC.912.P.12.5:	Apply the law of conservation of linear momentum to interactions, such as collisions between objects.
SC.912.P.12.6:	Qualitatively apply the concept of angular momentum.
SC.912.P.12.7:	Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving.
SC.912.P.12.9:	Recognize that time, length, and energy depend on the frame of reference.
SC.912.P.12.10:	Interpret the behavior of ideal gases in terms of kinetic molecular theory.
SC.912.P.12.11:	Describe phase transitions in terms of kinetic molecular theory.
SC.912.P.12.12:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.
50.912.P.12.13:	Explain the concept of dynamic equilibrium in terms of reversible processes occurring at the same rates.
LAFS.1112.RST.1.1:	or inconsistencies in the account.
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and tonics
LAFS 1112 RST 2.5	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or
LAES 1112 DST / 10-	concept, resolving conflicting information when possible.
LPH 3. TTT2.131.4. 10.	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as
LAFS.1112.SL.1.1:	 c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience,

	and a range of formal and informal tasks.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.1112.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.1112.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.1112.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.1112.WHST.4.10:	discipline-specific tasks, purposes, and audiences.
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i>
MAFS.912.F-IF.3.7:	 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star Represent data with plots on the real number line (dot plots, histograms, and box plots). \star
MAFS.912.S-ID.1.1:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.2:	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ★ Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.3:	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. \star
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. 🖈

	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting
	Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting
MAFS.K12.MP.4.1:	Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting
MAFS.K12.MP.5.1:	Ose appropriate tools strategically. Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.

Standard Relation to Course: Supporting Look for and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation (y - 2)/(x - 1) = 3. Noticing the regularity in the way terms cancel when expanding (x - 1)(x + 1), (x - 1)(x² + x + 1), and (x - 1)(x³ + x² + x + 1) might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results. ELD.K12.ELL.SC.1: English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science. ELD.K12.ELL.SI.1: English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

- Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:
- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2002440	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number . 2002440	Education Courses > Subject: Science > SubSubject
	Integrated Sciences >
	Abbreviated Title: INTEG SCI 3
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Class Size Core Required
Course Type: Core Academic Course	Course Level: 2

Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

rth/Space Science (Grades 6-12)
iysics (Grades 6-12)
ience (Secondary Grades 7-12)
ology (Grades 6-12)
nemistry (Grades 6-12)

Integrated Science 3 (#2002440) 2022 - And Beyond

Name	Description
SC.912.E.5.9:	Analyze the broad effects of space exploration on the economy and culture of Florida.
SC.912.E.6.4:	Analyze how specific geologic processes and features are expressed in Florida and elsewhere.
SC.912.E.7.6:	Relate the formation of severe weather to the various physical factors.
SC.912.E.7.8:	Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually and collectively.
SC.912.E.7.9:	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
SC.912.L.15.10:	Identify basic trends in hominid evolution from early ancestors six million years ago to modern humans, including brain size, jaw size, language, and manufacture of tools.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.15.14:	Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.8:	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.13:	Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.
SC.912.L.17.5:	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.
SC.912.L.17.6:	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
SC.912.L.18.10:	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known.
	4 Review what is known in light of empirical evidence. (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
	5. Plan investigations, (Design and evaluate a scientific investigation).
SC.912.N.1.1:	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	set-up, calibration, technique, maintenance, and storage).
	7. Pose answers, explanations, or descriptions of events,
	8. Generate explanations that explicate or describe natural phenomena (inferences),
	9. Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
CC 012 N 1 2	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical
SC.912.N.1.3:	thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).

SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing such as art, philosophy, and religion
	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and
SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger,
	leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.8.10:	Describe oxidation-reduction reactions in living and non-living systems.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.
SC.912.P.10.3:	Compare and contrast work and power qualitatively and quantitatively.
SC.912.P.10.6:	Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum.
SC.912.P.10.9:	Describe the quantization of energy at the atomic level.
SC.912.P.10.11:	Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues.
SC.912.P.10.16:	Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and electric fields, and their application to modern technologies.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.10.21:	Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.
SC.912.P.10.22:	Construct ray diagrams and use thin lens and mirror equations to locate the images formed by lenses and mirrors.
SC.912.P.12.5:	Apply the law of conservation of linear momentum to interactions, such as collisions between objects.
SC.912.P.12.6:	Qualitatively apply the concept of angular momentum.
SC.912.P.12.7:	Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving.
SC.912.P.12.9:	Recognize that time, length, and energy depend on the frame of reference.
SC.912.P.12.10:	Interpret the behavior of ideal gases in terms of kinetic molecular theory.
SC.912.P.12.11:	Describe phase transitions in terms of kinetic molecular theory.
SC.912.P.12.12:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.
	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task.
	 Stay engaged and maintain a positive mindset when working to solve tasks.
MA K12 MTR 1 1 [.]	Help and support each other when attempting a new method or approach.
	Clarifications:
	leachers who encourage students to participate actively in effortful learning both individually and with others:
	Cuttivate a community of growth mindset learners. Easter persouverance in students by choosing tacks that are challenging
	 Poster perseverance in students by choosing tasks that are chanenging. Develop students' ability to analyze and problem solve.
	Becognize students' effort when solving challenging problems
	• Recognize students enort when solving chanenging problems.
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:
	Build understanding through modeling and using manipulatives.
	Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
	 Progress from modeling problems with objects and drawings to using algorithms and equations.
	Express connections between concepts and representations.
MA.K12.MTR.2.1:	Choose a representation based on the given context or purpose.
	Clarifications:
	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:
	Help students make connections between concepts and representations.
	 Provide opportunities for students to use manipulatives when investigating concepts.
	 Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various conceptations can have different purposes and can be useful in different cituations.
	• Show students that various representations can have different purposes and can be dserur in different studations.
	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:
	Select efficient and appropriate methods for solving problems within the given context
	Maintain flexibility and accuracy while performing procedures and mental calculations
	Complete tasks accurately and with confidence.
	Adapt procedures to apply them to a new context.
MA.K12.MTR.3.1:	Use feedback to improve efficiency when performing calculations.

	 Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
MA.K12.MTR.4.1:	 Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence.
	Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
	 Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems.
MA.K12.MTR.5.1:	 Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used.
MA.K12.MTR.6.1:	 Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or
MA.K12.MTR.7.1:	efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ela.k12.ee.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide

	referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills.
	Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing.
	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit

https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades Prek to 12 Education
Course Number: 2002440	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2002440	Education Courses > Subject: Science > SubSubject:
	Integrated Sciences >
	Abbreviated Title: INTEG SCI 3
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Class Size Core Required
Course Type: Core Academic Course	Course Level: 2
Course Status: State Board Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Earth/Space Science (Grades 6-12)
Physics (Grades 6-12)
Science (Secondary Grades 7-12)
Biology (Grades 6-12)
Chemistry (Grades 6-12)

Integrated Science 3 Honors (#2002450) 2015 - 2022 (current)

Name	Description
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.
SC.912.E.5.9:	Analyze the broad effects of space exploration on the economy and culture of Florida.
SC.912.E.6.4:	Analyze how specific geologic processes and features are expressed in Florida and elsewhere.
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
SC.912.E.7.5:	Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions.
SC.912.E.7.6:	Relate the formation of severe weather to the various physical factors.
SC.912.E.7.8:	Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually and collectively.
SC.912.E.7.9:	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water,
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.
SC.912.L.15.2:	Discuss the use of molecular clocks to estimate how long ago various groups of organisms diverged evolutionarily from one another.
SC.912.L.15.3:	Describe how biological diversity is increased by the origin of new species and how it is decreased by the natural process of extinction.
SC.912.L.15.4:	Describe how and why organisms are hierarchically classified and based on evolutionary relationships.
SC.912.L.15.5:	Explain the reasons for changes in how organisms are classified.
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
SC.912.1.15.8:	Describe the scientific explanations of the origin of life on Farth.
SC.912.L.15.10:	Identify basic trends in hominid evolution from early ancestors six million years ago to modern humans, including brain size, jaw size, language, and manufacture of tools.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success
SC 912 L 15 14	Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow
SC 912 L 15 15	Describe how mutation and genetic recombination increase genetic variation
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring
SC 9121 16 8	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer
SC 912 L 16 10	Evaluate the impact of biotechnology on the individual society and the environment, including medical and ethical issues
30.712.E.10.10.	Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to
SC.912.L.16.13:	birth and major changes that occur in each trimester of pregnancy.
SC.912.L.17.2:	Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.5:	Analyze now population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.
SC.912.L.17.6:	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
SC.912.L.18.10:	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including

	set-up, calibration, technique, maintenance, and storage).
	7. Pose answers, explanations, or descriptions of events,
	8. Generate explanations that explicate or describe natural phenomena (inferences),
	9. Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
CC 012 N 2 2	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as
30.912.11.2.2.	questions addressed by other ways of knowing, such as art, philosophy, and religion.
	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and
SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena: thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.P.8.10:	Describe oxidation-reduction reactions in living and non-living systems.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an
SC 012 D 10 2	Solated system is a conserved quantity.
SC 912 P 10 6	Compare and contrast work and power qualitatively and qualitatively.
SC 912 P 10 9	Describe the quantization of energy at the atomic level
SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).
SC.912.P.10.11:	Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues
SC.912.P.10.13:	Relate the configuration of static charges to the electric field, electric force, electric potential, and electric potential energy.
SC.912.P.10.16:	Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and electric fields, and their application to modern technologies.
SC.912.P.10.17:	Explore the theory of electromagnetism by explaining electromagnetic waves in terms of oscillating electric and magnetic fields.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.10.21:	Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.
SC.912.P.10.22:	Construct ray diagrams and use thin lens and mirror equations to locate the images formed by lenses and mirrors.
SC.912.P.12.5:	Apply the law of conservation of linear momentum to interactions, such as collisions between objects.
SC.912.P.12.6:	Qualitatively apply the concept of angular momentum.
SC.912.P.12.7:	Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving.
SC.912.P.12.9:	Recognize that time, length, and energy depend on the frame of reference.
SC.912.P.12.10:	Interpret the behavior of ideal gases in terms of kinetic molecular theory.
SC.912.P.12.11:	Describe phase transitions in terms of kinetic molecular theory.
SC.912.P.12.12:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.
SC.912.P.12.13:	Explain the concept of dynamic equilibrium in terms of reversible processes occurring at the same rates.
LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible
LAFS,1112 RST 4 10	By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity hand independently and proficiently
	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
	from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.
LAFS 1112 SL 1 1.	b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as
L. I. O. I. I. Z. OL. I. I.	necucu.

	c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on
	a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.
	d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions
	when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest
	Write arguments focused on <i>discipline-specific content</i> .
	a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims,
LAFS.1112.WHST.1.1:	 b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases.
	c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
	d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
	e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among
	complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic:
	convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.
	e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.1112.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.1112.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of
LAF5.1112.WH51.4.10:	discipline-specific tasks, purposes, and audiences.
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i>
	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★
	a. Graph linear and quadratic functions and show intercepts, maxima, and minima.
MAFS.912.F-IF.3.7:	 b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.
	d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.
	e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and
	amplitude, and using phase shift.
MAFS.912.G-MG.1.2:	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star
MAFS.912.N-VM.1.3:	Solve problems involving velocity and other quantities that can be represented by vectors.
IVIAFS.912.S-IC.2.6:	Evaluate reports based on data. *
	Clarifications:
MAFS.912.S-ID.1.1:	
	In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the

	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ★
MAFS.912.S-ID.1.2:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). 🖈
MAFS.912.S-ID.1.3:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. \star
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.
MAFS.912.S-ID.2.6:	 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association.
	Clarifications: Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting
MAFS.K12.MP.2.1:	Reason abstractly and quantitatively. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects. Standard Relation to Course: Supporting
	Construct viable arguments and critique the reasoning of others.
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting Model with mathematics
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose. Standard Relation to Course: Supporting
	Use appropriate tools strategically.
	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper,

Attend to precision. MAFS.K12.MP.6.1: MAFS.K12.MP.7.1:	MAFS.K12.MP.5.1:	Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
MAFS.K12.MP.6.1: Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions. Standard Relation to Course: Supporting Look for and make use of structure. MAFS.K12.MP.7.1: Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression x ² + 9x + 14, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see complicated things, such as positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y. Standard Relation to Course: Supporting Look for and express regularity in repeated reasoning. MA		Attend to precision.
Standard Relation to Course: Supporting Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression x ² + 9x + 14, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 - 3(x - y) ² as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y. Standard Relation to Course: Supporting Look for and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation (y - 2)/(x - 1) = 3. Noticing the regularity in the way terms cancel when expanding (x - 1)(x + 1),	MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression x ² + 9x + 14, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – 3(x – y) ² as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y. Standard Relation to Course: Supporting Look for and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation (y – 2)/(x – 1) = 3. Noticing the regularity in the way terms cancel when expanding (x – 1)(x + 1),		Standard Relation to Course: Supporting
 Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression x² + 9x + 14, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – 3(x – y)² as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y. Standard Relation to Course: Supporting Look for and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation (y – 2)/(x – 1) = 3. Noticing the regularity in the way terms cancel when expanding (x – 1)(x + 1), 		Look for and make use of structure.
Standard Relation to Course: Supporting Look for and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, MAFS.K12.MP.8.1: MAFS.K12.MP.8.1: middle school students might abstract the equation (y - 2)/(x - 1) = 3. Noticing the regularity in the way terms cancel when expanding (x - 1)(x + 1),	MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, MAFS.K12.MP.8.1: middle school students might abstract the equation (y - 2)/(x - 1) = 3. Noticing the regularity in the way terms cancel when expanding (x - 1)(x + 1),		Standard Relation to Course: Supporting Look for and express regularity in repeated reasoning.
$(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.	MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
Standard Relation to Course: Supporting		Standard Relation to Course: Supporting English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science
FLD.K12.ELL.Sc.1: English language learners communicate information, ideas and concepts necessary for academic success in the content area of science.	FLD.K12.FLL.SU.1:	English language learners communicate information, locas and concepts necessary for academic success in the content area of science.

GENERAL NOTES

While the content focus of this course is consistent with the Integrated Science 3 course, students will explore these concepts in greater depth. In general, the academic pace and rigor will be greatly increased for honors level course work.

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.

- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education	
Course Number: 2002450	Courses > Grade Group: Grades 9 to 12 and Adult	
Course Number: 2002450	Education Courses > Subject: Science > SubSubject:	
	Integrated Sciences >	
	Abbreviated Title: INTEG SCI 3 HON	
Number of Credits: One (1) credit	Course Length: Year (Y)	
	Course Attributes:	
	Honors	
	Class Size Core Required	
Course Type: Core Academic Course	Course Level: 3	
Course Status: Course Approved		
Grade Level(s): 9,10,11,12		
Graduation Requirement: Equally Rigorous Science		

arth/Space Science (Grades 6-12)
hysics (Grades 6-12)
cience (Secondary Grades 7-12)
iology (Grades 6-12)
hemistry (Grades 6-12)

Integrated Science 3 Honors (#2002450) 2022 - And Beyond

Name	Description
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.
SC.912.E.5.9:	Analyze the broad effects of space exploration on the economy and culture of Florida.
SC.912.E.6.4:	Analyze how specific geologic processes and features are expressed in Florida and elsewhere.
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
SC.912.E.7.5:	Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions.
SC.912.E.7.6:	Relate the formation of severe weather to the various physical factors.
SC.912.E.7.8:	Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually and collectively.
SC.912.E.7.9:	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.
SC.912.L.15.2:	Discuss the use of molecular clocks to estimate how long ago various groups of organisms diverged evolutionarily from one another.
SC.912.L.15.3:	Describe how biological diversity is increased by the origin of new species and how it is decreased by the natural process of extinction.
SC.912.L.15.4:	Describe how and why organisms are hierarchically classified and based on evolutionary relationships.
SC.912.L.15.5:	Explain the reasons for changes in how organisms are classified.
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
SC.912.L.15.8:	Describe the scientific explanations of the origin of life on Earth.
SC.912.L.15.10:	Identify basic trends in hominid evolution from early ancestors six million years ago to modern humans, including brain size, jaw size, language, and manufacture of tools.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.15.14:	Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.8:	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.13:	Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.
SC.912.L.17.2:	Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.5:	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.
SC.912.L.17.6:	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism,
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests,
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution
SC.912.1.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
SC.912.L.18.10:	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature expansion upon freezing and versatility as a solvent
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including

	set-up, calibration, technique, maintenance, and storage).
	7. Pose answers, explanations, or descriptions of events,
	8. Generate explanations that explicate or describe natural phenomena (inferences),
	9. Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	The Evaluate the ments of the explanations produced by others.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
30.912.10.1.7.	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as
SC.912.N.2.2:	questions addressed by other ways of knowing, such as art, philosophy, and religion.
	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and
SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger,
	leading to its durability.
SC.912.N.2.5:	make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as
	they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC 912 N 3 1	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial
36.712.11.3.1.	range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.P.8.10:	Describe oxidation-reduction reactions in living and non-living systems.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.
SC.912.P.10.3:	Compare and contrast work and power qualitatively and quantitatively.
SC.912.P.10.6:	Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum.
SC.912.P.10.9:	Describe the quantization of energy at the atomic level.
SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).
SC.912.P.10.11:	Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues.
SC.912.P.10.13:	Relate the configuration of static charges to the electric field, electric force, electric potential, and electric potential energy.
SC.912.P.10.16:	Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and electric fields, and their application to modern technologies.
SC.912.P.10.17:	Explore the theory of electromagnetism by explaining electromagnetic waves in terms of oscillating electric and magnetic fields.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.10.21:	Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.
SC.912.P.10.22:	Construct ray diagrams and use thin lens and mirror equations to locate the images formed by lenses and mirrors.
SC.912.P.12.5:	Apply the law of conservation of linear momentum to interactions, such as collisions between objects.
SC.912.P.12.6:	Qualitatively apply the concept of angular momentum.
SC.912.P.12.7:	moving.
SC.912.P.12.9:	Recognize that time, length, and energy depend on the frame of reference.
SC.912.P.12.10:	Describe phase transitions in terms of kinetic molecular theory.
SC.912.P.12.11:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.
SC.912.P.12.13:	Explain the concept of dynamic equilibrium in terms of reversible processes occurring at the same rates.
	Mathematicians who participate in effortful learning both individually and with others:
	Analyze the problem in a way that makes sense given the task.
	Ask questions that will help with solving the task.
	Build perseverance by modifying methods as needed while solving a challenging task.
	Stay engaged and maintain a positive mindset when working to solve tasks.
MA.K12.MTR.1.1:	Help and support each other when attempting a new method or approach.
	Clarifications:
	Cultivate a community of growth mindset learners
	 Foster perseverance in students by choosing tasks that are challenging.
	Develop students' ability to analyze and problem solve.
	Recognize students' effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways.
	Mathematicians who demonstrate understanding by representing problems in multiple ways:
	Build understanding through modeling and using manipulatives.
	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
	Progress from modeling problems with objects and drawings to using algorithms and equations.
	Express connections between concepts and representations.
MA.K12.MTR.2.1:	Choose a representation based on the given context or purpose.
	Clarifications:
	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:
	Heip students make connections between concepts and representations.

	 Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	 Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers
	 Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers. Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems.
MA.K12.MTR.5.1:	 Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations.
	 Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	 Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
	 Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts:
MA.K12.MTR.7.1:	 Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
	Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations.

	 Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
ELA.K12.EE.1.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing.
	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

While the content focus of this course is consistent with the Integrated Science 3 course, students will explore these concepts in greater depth. In general, the academic pace and rigor will be greatly increased for honors level course work.

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.

5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

• Asking questions (for science) and defining problems (for engineering).

- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2002450	Education Courses > Subject: Science > SubSubject:
	Integrated Sciences >
	Abbreviated Title: INTEG SCI 3 HON
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
	Class Size Core Required
Course Type: Core Academic Course	Course Level: 3
Course Status: State Board Approved	
Grade Level(s): 9,10,11,12	

Educator Certifications

Graduation Requirement: Equally Rigorous Science

rth/Space Science (Grades 6-12)
ysics (Grades 6-12)
ience (Secondary Grades 7-12)
ology (Grades 6-12)
emistry (Grades 6-12)
Forensic Science 1 (#2002480) 2017 - 2022 (current)

Name	Description
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.
SC.912.L.14.1:	Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.
SC.912.L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).
SC.912.L.14.4:	Compare and contrast structure and function of various types of microscopes.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.14.11:	Classify and state the defining characteristics of epithelial tissue, connective tissue, muscle tissue, and nervous tissue.
SC.912.L.14.12:	Describe the anatomy and histology of bone tissue.
SC.912.L.14.34:	Describe the composition and physiology of blood, including that of the plasma and the formed elements.
SC.912.L.14.35:	Describe the steps in hemostasis, including the mechanism of coagulation. Include the basis for blood typing and transfusion reactions.
SC.912.L.14.51:	Describe the function of the vertebrate integumentary system.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC.912.L.16.9:	Explain how and why the genetic code is universal and is common to almost all organisms.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.11:	Discuss the technologies associated with forensic medicine and DNA identification, including restriction fragment length polymorphism (RFLP) analysis.
SC.912.L.16.12:	Describe how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and transformation) is used to construct recombinant DNA molecules (DNA cloning).
SC.912.L.17.1:	Discuss the characteristics of populations, such as number of individuals, age structure, density, and pattern of distribution.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.N.1.1:	 Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.8.1:	Differentiate among the four states of matter.
SC.912.P.8.2:	Differentiate between physical and chemical properties and physical and chemical changes of matter.
SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.

SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.
SC.912.P.8.12:	Describe the properties of the carbon atom that make the diversity of carbon compounds possible.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.
SC.912.P.10.21:	Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.
SC.912.P.12.1:	Distinguish between scalar and vector quantities and assess which should be used to describe an event.
SC.912.P.12.2:	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.
SC.912.P.12.3:	Interpret and apply Newton's three laws of motion.
SC.912.P.12.5:	Apply the law of conservation of linear momentum to interactions, such as collisions between objects.
SC.912.P.12.7:	Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving.
SC.912.P.12.9:	Recognize that time, length, and energy depend on the frame of reference.
SC.912.P.12.12:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.
LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the
LAFS.TTT2.RST.1.3:	specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LAFS.1112.RST.4.10:	By the end of grade 12, read and comprehend science/technical texts in the grades 11-12 text complexity band independently and proficiently.
LAFS.1112.SL.1.1:	 a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when provide the divergent the divergent the divergent term.
	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed
LAFS.1112.SL.1.2:	decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	points of emphasis, and tone used.
LAFS.1112.SL.2.4:	alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.1112.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.

	d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic;
	 e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.1112.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.1112.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.1112.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
LAFS.910.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
LAFS.910.RST.1.3:	special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	context relevant to grades 9–10 texts and topics.
LAFS.910.RST.2.5:	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.RST.4.10:	By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings) araphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
LAFS.910.WHST.1.2:	 b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts.
	 d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★
MAFS.912.F-IF.3.7:	 a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. \star
MAFS.912.N-Q.1.3: MAFS.912.N-VM.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. *
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students to solving complex problems and identify correspondences between different approaches.
	Reason abstractly and quantitatively.
	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically

MAFS.K12.MP.2.1:	and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting Model with mathematics.
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
ELD.K12.ELL.SC.1:	Standard Relation to Course: Supporting English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- · Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2002490	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2002480	Education Courses > Subject: Science > SubSubject:
	Integrated Sciences >
	Abbreviated Title: FOR SCI 1
Number of Credits: One (1) credit	Course Length: Year (Y)
Course Type: Core Academic Course	Course Level: 2
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Educator Certifications

Middle Grades General Science (Middle Grades 5-9) Earth/Space Science (Grades 6-12) Physics (Grades 6-12) Science (Secondary Grades 7-12)

Biology (Grades 6-12) Chemistry (Grades 6-12)

Forensic Science 1 (#2002480) 2022 - And Beyond

Name	Description
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.
SC.912.L.14.1:	Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.
SC.912.L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).
SC.912.L.14.4:	Compare and contrast structure and function of various types of microscopes.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.14.11:	Classify and state the defining characteristics of epithelial tissue, connective tissue, muscle tissue, and nervous tissue.
SC.912.L.14.12:	Describe the anatomy and histology of bone tissue.
SC.912.L.14.34:	Describe the composition and physiology of blood, including that of the plasma and the formed elements.
SC.912.L.14.35:	Describe the steps in hemostasis, including the mechanism of coagulation. Include the basis for blood typing and transfusion reactions.
SC.912.L.14.51:	Describe the function of the vertebrate integumentary system.
SC 912 L 15 15	Describe how mutation and genetic recombination increase genetic variation
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles
SC 912 L 16 9	Explain how and why the genetic code is universal and is common to almost all organisms
SC 912 L 16 10	Evaluate the impact of biotechnology on the individual society and the environment, including medical and ethical issues
56.712.L.10.10.	Evaluate the impact of bloted mology of the individual, society and the environment, including neuron fragment length polymorphism (DELP)
SC.912.L.16.11:	analysis.
SC.912.L.16.12:	Describe how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and transformation) is used to construct recombinant DNA molecules (DNA cloning).
SC.912.L.17.1:	Discuss the characteristics of populations, such as number of individuals, age structure, density, and pattern of distribution.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.N.1.1:	 Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.8.1:	Differentiate among the four states of matter.
SC.912.P.8.2:	Differentiate between physical and chemical properties and physical and chemical changes of matter.
SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.

SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.
SC.912.P.8.12:	Describe the properties of the carbon atom that make the diversity of carbon compounds possible.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.
SC.912.P.10.21:	Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.
SC.912.P.12.1:	Distinguish between scalar and vector quantities and assess which should be used to describe an event.
SC.912.P.12.2:	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.
SC.912.P.12.3:	Interpret and apply Newton's three laws of motion.
SC.912.P.12.5:	Apply the law of conservation of linear momentum to interactions, such as collisions between objects.
SC.912.P.12.7:	Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving.
SC.912.P.12.9:	Recognize that time, length, and energy depend on the frame of reference.
SC.912.P.12.12: MA.K12.MTR.1.1:	 Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction. Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach. Clarifications: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve.
	Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	 Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose.
	 Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
	 Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used. Engage in discussions that reflect on the mathematical thinking of self and others.
MA.K12.MTR.4.1:	 Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence.
	 Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.

MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
	 Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts.
	 Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations.
	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
	Clarifications:
	 Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
	 Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
ELA.K12.EE.1.1:	K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
FI Δ K12 FF 2 1·	Read and comprehend grade-level complex texts proficiently.
ELA.K I 2.EE.2.1:	See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.

Use the accepted rules governing a specific format to create quality work.	
ELA.K12.EE.5.1: Clarifications: ELA.K12.EE.5.1: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, to must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present informat do quality work.	ey in to
Use appropriate voice and tone when speaking or writing.	
ELA.K12.EE.6.1: Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our f differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss	ends exts.
ELD.K12.ELL.SC.1: English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.	
ELD.K12.ELL.SI.1: English language learners communicate for social and instructional purposes within the school setting.	

I

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Course Number: 2002480

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Integrated Sciences > Number of Credits: One (1) credit Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Abbreviated Title: FOR SCI 1 Course Length: Year (Y) Course Level: 2

Educator Certifications

Middle Grades General Science (Middle Grades 5-9) Earth/Space Science (Grades 6-12) Physics (Grades 6-12) Science (Secondary Grades 7-12) Biology (Grades 6-12) Chemistry (Grades 6-12)

Forensic Sciences 2 (#2002490) 2017 - 2022 (current)

Name	Description
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.
SC.912.L.14.4:	Compare and contrast structure and function of various types of microscopes.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.14.11:	Classify and state the defining characteristics of epithelial tissue, connective tissue, muscle tissue, and nervous tissue.
SC.912.L.14.12:	Describe the anatomy and histology of bone tissue.
SC.912.L.14.13:	Distinguish between bones of the axial skeleton and the appendicular skeleton.
SC.912.L.14.14:	Identify the major bones of the axial and appendicular skeleton.
SC.912.L.14.15:	Identify major markings (such as foramina, fossae, tubercles, etc.) on a skeleton. Explain why these markings are important.
SC.912.L.14.16:	Describe the anatomy and histology, including ultrastructure, of muscle tissue.
SC.912.L.14.36:	Describe the factors affecting blood flow through the cardiovascular system.
SC.912.L.14.43:	Describe the histology of the respiratory system.
SC.912.L.14.44:	Describe the physiology of the respiratory system including the mechanisms of ventilation, gas exchange, gas transport and the mechanisms that control the rate of ventilation.
SC.912.L.14.46:	Describe the physiology of the digestive system, including mechanical digestion, chemical digestion, absorption and the neural and hormonal mechanisms of control.
SC.912.L.14.47:	Describe the physiology of urine formation by the kidney.
SC.912.L.16.3:	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.9:	Explain how and why the genetic code is universal and is common to almost all organisms.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.11:	Discuss the technologies associated with forensic medicine and DNA identification, including restriction fragment length polymorphism (RFLP) analysis.
SC.912.L.16.12:	Describe how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and transformation) is used to construct recombinant DNA molecules (DNA cloning).
SC.912.L.17.6:	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.18.3:	Describe the structures of fatty acids, triglycerides, phospholipids, and steroids. Explain the functions of lipids in living organisms. Identify some reactions that fatty acids undergo. Relate the structure and function of cell membranes.
SC.912.L.18.4:	Describe the structures of proteins and amino acids. Explain the functions of proteins in living organisms. Identify some reactions that amino acids undergo. Relate the structure and function of enzymes.
SC.912.L.18.10:	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.

SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and
SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.
SC.912.P.8.8:	Characterize types of chemical reactions, for example: redox, acid-base, synthesis, and single and double replacement reactions.
SC.912.P.8.10:	Describe oxidation-reduction reactions in living and non-living systems.
SC.912.P.8.13:	Identify selected functional groups and relate how they contribute to properties of carbon compounds.
SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter.
SC.912.P.10.7:	Distinguish between endothermic and exothermic chemical processes.
SC.912.P.10.13:	Relate the configuration of static charges to the electric field, electric force, electric potential, and electric potential energy.
SC.912.P.10.14:	Differentiate among conductors, semiconductors, and insulators.
SC.912.P.10.15:	Investigate and explain the relationships among current, voltage, resistance, and power.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.12.1:	Distinguish between scalar and vector guantities and assess which should be used to describe an event.
SC.912.P.12.2:	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.
SC.912.P.12.3:	Interpret and apply Newton's three laws of motion.
SC.912.P.12.5:	Apply the law of conservation of linear momentum to interactions, such as collisions between objects.
SC.912.P.12.6:	Qualitatively apply the concept of angular momentum.
SC.912.P.12.12:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.
LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics
LAFS 1112 RST 2 5	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challopping conclusions with other sources of information
LAFS.1112.RST.3.9:	Synthesize information for a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or
	concept, resolving conflicting information when possible.
LAI 3.1112.N31.4, 10.	 by the end of grade 12, read and comprehend science technical texts in the grades 11-12 text complexity dark independently and protocently. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11-12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as
LAFS.1112.SL.1.1:	 needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS 1112 SL 1 3	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice,
EAR 0.1112.0E.110.	points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a reason of formal and information to formal tables.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence.
LAFS.1112.WHST.1.1:	b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases.

	c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
	d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.1112.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
LAFS.1112.WHST.3.7: LAFS.1112.WHST.3.8:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of
LAES 1112 WHST 3 0	ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
LAFS.1112.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of
LAFS.910.RST.1.1:	discipline-specific tasks, purposes, and audiences. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.2.5:	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.RST.4.10:	By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.
LAFS.910.WHST.1.2:	 a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
MAFS.912.F-IF.3.7:	 a. Graph linear and quadratic functions and show key reatures of the graph, by hard in simple cases and using technology for more complicated cases. a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. \star
MAFS.912.N-Q.1.3: MAFS.912.N-VM 1.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★
	Make sense of problems and persevere in solving them. Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students

MAFS.K12.MP.1.1:	might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches. Standard Relation to Course: Supporting
	Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others.
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as $5 = 0$ minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting Look for and express regularity in repeated reasoning.
	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3,

MAFS.K12.MP.8.1:	middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results. Standard Relation to Course: Supporting
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2002400	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2002490	Education Courses > Subject: Science > SubSubject:
	Integrated Sciences >
	Abbreviated Title: FOR SCI 2
Number of Credits: One (1) credit	Course Length: Year (Y)
Course Type: Core Academic Course	Course Level: 2
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	

Graduation Requirement: Equally Rigorous Science

Educator Certifications

Middle Grades General Science (Middle Grades 5-9) Earth/Space Science (Grades 6-12) Biology (Grades 6-12) Chemistry (Grades 6-12) Physics (Grades 6-12) Science (Secondary Grades 7-12)

Forensic Sciences 2 (#2002490) 2022 - And Beyond

Name	Description
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.
SC.912.L.14.4:	Compare and contrast structure and function of various types of microscopes.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.14.11:	Classify and state the defining characteristics of epithelial tissue, connective tissue, muscle tissue, and nervous tissue.
SC.912.L.14.12:	Describe the anatomy and histology of bone tissue.
SC.912.L.14.13:	Distinguish between bones of the axial skeleton and the appendicular skeleton.
SC.912.L.14.14:	Identify the major bones of the axial and appendicular skeleton.
SC.912.L.14.15:	Identify major markings (such as foramina, fossae, tubercles, etc.) on a skeleton. Explain why these markings are important.
SC.912.L.14.16:	Describe the anatomy and histology, including ultrastructure, of muscle tissue.
SC.912.L.14.36:	Describe the factors affecting blood flow through the cardiovascular system.
SC.912.L.14.43:	Describe the histology of the respiratory system.
SC.912.L.14.44:	Describe the physiology of the respiratory system including the mechanisms of ventilation, gas exchange, gas transport and the mechanisms that control the rate of ventilation.
SC.912.L.14.46:	Describe the physiology of the digestive system, including mechanical digestion, chemical digestion, absorption and the neural and hormonal mechanisms of control.
SC.912.L.14.47:	Describe the physiology of urine formation by the kidney.
SC.912.L.16.3:	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.9:	Explain how and why the genetic code is universal and is common to almost all organisms.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.11:	Discuss the technologies associated with forensic medicine and DNA identification, including restriction fragment length polymorphism (RFLP) analysis.
SC.912.L.16.12:	Describe how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and transformation) is used to construct recombinant DNA molecules (DNA cloning).
SC.912.L.17.6:	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.18.3:	Describe the structures of fatty acids, triglycerides, phospholipids, and steroids. Explain the functions of lipids in living organisms. Identify some reactions that fatty acids undergo. Relate the structure and function of cell membranes.
SC.912.L.18.4:	Describe the structures of proteins and amino acids. Explain the functions of proteins in living organisms. Identify some reactions that amino acids undergo. Relate the structure and function of enzymes.
SC.912.L.18.10:	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and 11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.

SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and
SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger,
	leading to its durability.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain now scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	weigh the ments of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental
SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.
SC.912.P.8.8:	Characterize types of chemical reactions, for example: redox, acid-base, synthesis, and single and double replacement reactions.
SC.912.P.8.10:	Describe oxidation-reduction reactions in living and non-living systems.
SC.912.P.8.13:	Identify selected functional groups and relate how they contribute to properties of carbon compounds.
SC 012 D 10 4	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or
30.712.F.10.4.	states of matter.
SC.912.P.10.7:	Distinguish between endothermic and exothermic chemical processes.
SC.912.P.10.13:	Relate the configuration of static charges to the electric field, electric force, electric potential, and electric potential energy.
SC.912.P.10.14:	Differentiate among conductors, semiconductors, and insulators.
SC.912.P.10.15:	Investigate and explain the relationships among current, voltage, resistance, and power.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC 912 P 12 1	Distinguish between scalar and vector guantities and assess which should be used to describe an event
SC 912 P 12 2	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time
SC.912.P.12.3:	Interpret and apply Newton's three laws of motion.
SC.912.P.12.5:	Apply the law of conservation of linear momentum to interactions, such as collisions between objects.
SC.912.P.12.6:	Qualitatively apply the concept of angular momentum.
SC.912.P.12.12:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.
	Mathematicians who participate in effortful learning both individually and with others:
	 Analyze the problem in a way that makes sense given the task.
	Ask questions that will help with solving the task.
	 Build perseverance by modifying methods as needed while solving a challenging task.
	 Stay engaged and maintain a positive mindset when working to solve tasks.
MA V12 MTD 1 1-	Help and support each other when attempting a new method or approach.
WIA.R 12.WITR.1.1.	Clarifications:
	Teachers who encourage students to participate actively in effortful learning both individually and with others:
	Cultivate a community of growth mindset learners.
	 Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to apply and problem solve
	Develop students' ability to analyze and problem solve. Pocognize students' affort when solving shallonging problems
	• Necognize students errort when solving chanenging problems.
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways.
	Mathematicians who demonstrate dude standing by representing problems in multiple ways.
	Build understanding through modeling and using manipulatives.
	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
	 Progress from modeling problems with objects and drawings to using algorithms and equations.
	Express connections between concepts and representations.
MA.K12.MTR.2.1:	Choose a representation based on the given context or purpose.
	Clarifications:
	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:
	Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts
	Guide students from concrete to nictorial to abstract representations as understanding progresses
	 Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:
	watternationalis who complete tasks with matternation neerby.
	 Select efficient and appropriate methods for solving problems within the given context.
	Maintain flexibility and accuracy while performing procedures and mental calculations.
MA.K12.MTR.3.1:	Complete tasks accurately and with confidence.
	Adapt procedures to apply them to a new context.
	 Use reedback to improve enciency when performing calculations.
	Clarifications:
	Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve officiently and accurately
	 Offer multiple opportunities for students to practice efficient and generalizable methods.
	 Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used
	Engage in discussions that reflect on the mathematical thinking of cells and others
	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
	manomation of the ongage in discussions that onot on the matternation trinking of self and others.

MA.K12.MTR.4.1:	 Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	 Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations.
	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.

ELA.K12.EE.3.1:	Make inferences to support comprehension.
	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing.
	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2002490

Number of Credits: One (1) credit Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Integrated Sciences > Abbreviated Title: FOR SCI 2 Course Length: Year (Y) Course Level: 2

Educator Certifications

ddle Grades General Science (Middle Grades 5-9)
th/Space Science (Grades 6-12)
logy (Grades 6-12)
emistry (Grades 6-12)
ysics (Grades 6-12)
ence (Secondary Grades 7-12)

Marine Science 1 (#2002500) 2015 - 2022 (current)

Name	Description
SC.912.E.7.9:	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.17.1:	Discuss the characteristics of populations, such as number of individuals, age structure, density, and pattern of distribution.
SC.912.L.17.2:	Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.
SC.912.L.17.3:	Discuss how various oceanic and freshwater processes, such as currents, tides, and waves, affect the abundance of aquatic organisms.
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.6:	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.
SC.912.L.17.7:	Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.17.10:	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
SC 912 18 12 [.]	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate
	temperature, expansion upon freezing, and versatility as a solvent.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: 1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
	5. Plan investigations, (Design and evaluate a scientific investigation).
SC.912.N.1.1:	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	set-up, calibration, technique, maintenance, and storage).
	7. Pose answers, explanations, or descriptions of events,
	8. Generate explanations that explicate or describe natural phenomena (inferences),
	9. Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
00.010 NI 4.0	
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and
SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they
SC.912.N.2.5:	make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as
	they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.

SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.
LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LAFS.1112.RST.4.10:	By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.
LAFS.1112.SL.1.1:	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.1112.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.1112.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.1112.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.1112.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing,</i>
	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. \star
MAFS.912.F-IF.3.7:	 a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. \star
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star
	Represent data with plots on the real number line (dot plots, histograms, and box plots). ★
MAFS.912.S-ID.1.1:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ★
MAFS.912.S-ID.1.2:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
MAFS.912.S-ID.1.3:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting
	Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
MAFS.K12.MP.3.1:	Construct viable arguments and critique the reasoning of others. Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting
	Model with mathematics.
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know
	are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are

	able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose. Standard Relation to Course: Supporting
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results. Standard Relation to Course: Supporting
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGl/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2002E00	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2002500	Education Courses > Subject: Science > SubSubject:
	Marine Sciences >
	Abbreviated Title: MARINE SCI 1
Number of Credits: One (1) credit	Course Length: Year (Y)
Course Type: Core Academic Course	Course Level: 2
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Educator Certifications

Biology (Grades 6-12)
Chemistry (Grades 6-12)
Physics (Grades 6-12)
arth/Space Science (Grades 6-12)
Science (Secondary Grades 7-12)

Marine Science 1 (#2002500) 2022 - And Beyond

Name	Description
SC.912.E.7.9:	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.17.1:	Discuss the characteristics of populations, such as number of individuals, age structure, density, and pattern of distribution.
SC.912.L.17.2:	Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.
SC.912.L.17.3:	Discuss how various oceanic and freshwater processes, such as currents, tides, and waves, affect the abundance of aquatic organisms.
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.6:	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.
SC.912.L.17.7:	Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.17.10:	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate
	temperature, expansion upon freezing, and versatility as a solvent.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: 1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
	5. Plan investigations, (Design and evaluate a scientific investigation).
SC.912.N.1.1:	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	set-up, calibration, technique, maintenance, and storage).
	7. Pose answers, explanations, or descriptions of events,
	8. Generate explanations that explicate or describe natural phenomena (inferences),
	9. Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC 912 N 1 2	Describe and explain what characterizes science and its methods
30.712.10.1.2.	Becomize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on, critical and logical
SC.912.N.1.3:	thinking, and the active consideration of alternative scientific explanations to explanate data presented.
SC.912.N.1.4.	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome
SC.912.N.1.5.	Describe and provide examples of now similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.0:	Describe now scientific interences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
30.912.10.2.1:	Superior that existence, what clearly is not science, and what superior any resembles science (but rais to meet the chief a for science).
SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they
SC.912.N.2.5:	make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as
	they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.

SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.
	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach.
MA.K12.MTR.1.1:	Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	 Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems.

	• Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
	Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences.
MA K12 MTP 7 1-	 Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
MA.K12.MTR.7.1:	 Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work.
	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1: ELD.K12.ELL.SI.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science. English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- · Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

	Course Path: Section: Grades Prek to 12 Education
Course Number: 2002500	Courses > Grade Group: Grades 9 to 12 and Adult
course Number. 2002300	Education Courses > Subject: Science > SubSubject
	Marine Sciences >
	Abbreviated Title: MARINE SCI 1
Number of Credits: One (1) credit	Course Length: Year (Y)
Course Type: Core Academic Course	Course Level: 2
Course Status: State Board Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Educator Certifications

Biology (Grades 6-12) Chemistry (Grades 6-12) Physics (Grades 6-12) Earth/Space Science (Grades 6-12) Science (Secondary Grades 7-12)

Marine Science 1 Honors (#2002510) 2015 - 2022 (current)

Name	Description
SC.912.E.7.6:	Relate the formation of severe weather to the various physical factors.
SC.912.E.7.9:	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.17.1:	Discuss the characteristics of populations, such as number of individuals, age structure, density, and pattern of distribution.
SC.912.L.17.2:	Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.
SC.912.L.17.3:	Discuss how various oceanic and freshwater processes, such as currents, tides, and waves, affect the abundance of aquatic organisms.
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.6:	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.
SC.912.L.17.7:	Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.17.10:	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
SC.912.L.17.17:	Assess the effectiveness of innovative methods of protecting the environment.
SC.912.L.17.18:	Describe how human population size and resource use relate to environmental quality.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
SC.912.N.1.1:	 Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.

SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human economic and environmental
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.
SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or pegative: relative maximums and minimums: symmetries: end behavior: and periodicity.</i>
	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima.
MAFS.912.F-IF.3.7:	 b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.G-MG.1.2:	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star
MAFS.912.S-IC.2.6:	Evaluate reports based on data. \star
MAFS.912.S-ID.1.1:	Represent data with plots on the real number line (dot plots, histograms, and box plots). ★ Clarifications: In grades 6 - 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. \star
MAFS.912.S-ID.1.2:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). ★
MAFS.912.S-ID.1.3:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. \star
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. ★
MAFS.912.S-ID.2.6:	 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association.
	Clarifications: Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of

	quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others.
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting Model with mathematics
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
I AES 1110 DOT 1 1.	Standard Relation to Course: Supporting Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps
LAFS. 1112.KS1.1.1.	or inconsistencies in the account. Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing
LAFS.1112.RST.1.2:	them in simpler but still accurate terms. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical
1	CONTEXT REPORT TO GRADES 11-12 TEXTS AND TOPICS.

.

LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades
	11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
	a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence
	b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as
LAFS.1112.SL.1.1:	needed.
	c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.
	d. Respond thoughtfully to diverse perspectives: synthesize comments, claims, and evidence made on all sides of an issue: resolve contradictions
	when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed
	decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings reasoning and evidence and to add interest
	Write arguments focused on <i>discipline-specific content</i> .
	 a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence.
	b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the
LAFS.1112.WHST.1.1:	strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level,
	c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships
	between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
	d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
	e. Provide a concluding statement or section that follows from or supports the argument presented.
	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
	a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a
	unitied whole; include formatting (e.g., neadings), graphics (e.g., ngures, tables), and multimedia when userul to alding comprehension.
	information and examples appropriate to the audience's knowledge of the topic.
LAFS.1112.WHST.1.2:	 c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.
	d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic;
	convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.
	e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications
	or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.2.5:	significant for a specific purpose and audience.
LAFS.1112.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.1112.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and
	limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of
LAFS 1112 WHST 2 D	Ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of
LAFS.1112.WHST.4.10:	discipline-specific tasks, purposes, and audiences.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

While the content focus of this course is consistent with the Marine Science I course, students will explore these concepts in greater depth. In general, the academic pace and rigor will be greatly increased for honors level course work. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high
school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The course also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGl/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

	Course Path: Section: Grades Prek to 12 Education
Course Number: 2002510	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2002510	Education Courses > Subject: Science > SubSubject
	Marine Sciences >
	Abbreviated Title: MARINE SCI 1 HON
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	

Educator Certifications

Graduation Requirement: Equally Rigorous Science

iology (Grades 6-12)
hemistry (Grades 6-12)
hysics (Grades 6-12)
arth/Space Science (Grades 6-12)
cience (Secondary Grades 7-12)

Marine Science 1 Honors (#2002510) 2022 - And Beyond

Name	Description
SC.912.E.7.6:	Relate the formation of severe weather to the various physical factors.
SC.912.E.7.9:	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.17.1:	Discuss the characteristics of populations, such as number of individuals, age structure, density, and pattern of distribution.
SC.912.L.17.2:	Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.
SC.912.L.17.3:	Discuss how various oceanic and freshwater processes, such as currents, tides, and waves, affect the abundance of aquatic organisms.
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.6:	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.
SC.912.L.17.7:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.17.10:	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
SC.912.L.17.17:	Assess the effectiveness of innovative methods of protecting the environment.
SC.912.L.17.18:	Describe how human population size and resource use relate to environmental quality.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1: SC.912.N.2.4:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science). Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.

SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an
SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves
	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks.
MA.K12.MTR.1.1:	 Help and support each other when attempting a new method or approach. Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose.
	 Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency:
	 Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence.
	 Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	 Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations.

	 Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
	 Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts:
	 Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
MA.K12.MTR.7.1:	Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
	 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
	In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.

ELA.K12.EE.6.1:	Clarifications:
	In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

While the content focus of this course is consistent with the Marine Science Lourse, students will explore these concepts in greater depth. In general, the academic pace and rigor will be greatly increased for honors level course work. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2002E10	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2002510	Education Courses > Subject: Science > SubSubject
	Marine Sciences >
	Abbreviated Title: MARINE SCI 1 HON
Number of Credits: One (1) credit	Course Length: Year (Y)

• Honors

Course Level: 3

Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

ology (Grades 6-12)	
nemistry (Grades 6-12)	
nysics (Grades 6-12)	
rth/Space Science (Grades 6-12)	
ience (Secondary Grades 7-12)	

Cambridge AICE Marine Science 1 AS Level (#2002515) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-advanced/cambridge-international-as-and-alevels/curriculum/.

GENERAL INFORMATION

Course Number: 2002515

Number of Credits: One (1) credit

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Marine Sciences > Abbreviated Title: AICE MARINE SCI 1 AS Course Length: Year (Y) Course Attributes: • Advanced International Certificate of Education (AICE) Course Level: 3

hemistry (Grades 6-12)
liology (Grades 6-12)
arth/Space Science (Grades 6-12)
cience (Secondary Grades 7-12)
hysics (Grades 6-12)

Marine Science 2 (#2002520) 2015 - 2022 (current)

Name	Description
SC.912.E.7.4:	Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans.
SC.912.E.7.8:	Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually and collectively.
SC.912.E.7.9:	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.5:	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.
SC.912.L.17.7:	Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.
SC.912.L.17.10:	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
SC.912.L.18.2:	Describe the important structural characteristics of monosaccharides, disaccharides, and polysaccharides and explain the functions of carbohydrates in living things.
SC.912.N.1.1:	 Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1: SC.912.N.2.4:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science). Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.
SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.
LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LAFS.1112.RST.4.10:	By the end of grade 12, read and comprehend science/technical texts in the grades 11-12 text complexity band independently and proficiently.
LAFS.1112.SL.1.1:	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.1112.WHST.1.1:	 a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a conclusion statement or section that follows from or supports the argument presented
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.1112.WHST.2.6:	Use technology, including the internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.1112.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.1112.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i>

	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★
MAFS.912.F-IF.3.7:	 a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and specified and showing and behavior.
	amplitude, and using phase shift.
MAFS.912.G-MG.1.2:	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). *
MAFS.912.N-Q.1.1:	choose and interpret the scale and the origin in graphs and data displays. \star
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star
MAFS.912.S-IC.2.6:	Evaluate reports based on data. ★ Represent data with plots on the real number line (dot plots, histograms, and box plots). ★
MAFS.912.S-ID.1.1:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. \star
MAFS.912.S-ID.1.2:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). 🖈
MAFS.912.S-ID.1.3:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. \star
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. \star
MAFS.912.S-ID.2.6:	 a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association.
	students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
	Nethemotically proficient at identic understand and use stated and use stated and use definitions and the invested by the described and use stated and use state
MAFS.K12.MP.3.1:	arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- · Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- · Constructing explanations (for science) and designing solutions (for engineering).
- · Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.
- Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Course Path: Section: Grades PreK to 12 Education

GENERAL INFORMATION

Course Number: 2002520	Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Marine Sciences >
	Abbreviated Title: MARINE SCI 2
Number of Credits: One (1) credit	Course Length: Year (Y)
Course Type: Core Academic Course	Course Level: 2
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

logy (Grades 6-12)
emistry (Grades 6-12)
ysics (Grades 6-12)
th/Space Science (Grades 6-12)
ence (Secondary Grades 7-12)

Marine Science 2 (#2002520) 2022 - And Beyond

Name	Description
SC.912.E.7.4:	Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans.
SC.912.E.7.8:	Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually and collectively.
SC.912.E.7.9:	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.5:	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.
SC.912.L.17.7:	Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.
SC.912.L.17.10:	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
SC.912.L.18.2:	Describe the important structural characteristics of monosaccharides, disaccharides, and polysaccharides and explain the functions of carbohydrates in living things.
SC.912.N.1.1:	 Define a problem based of a specific body of knowledge, for examples of the investigation and identify the relevant scientific concepts). Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC 912 N 1 2	Describe and explain what characterizes science and its methods
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.
SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.
	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task.

MA.K12.MTR.1.1:	 Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach. Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	 Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts. Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions.

MA.K12.MTR.6.1:	 Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context
	Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
	 Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1: ELD.K12.ELL.SI.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science. English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Course Path: Section: Grades PreK to 12 Education

GENERAL INFORMATION

 Courses Number: 2002520
 Courses > Grade Group: Grades 9 to 12 and Adult

 Education Courses > Subject: Science > SubSubject:
Marine Sciences >

 Marine Sciences >

 Abbreviated Title: MARINE SCI 2

 Number of Credits: One (1) credit
 Course Length: Year (Y)

 Course Type: Core Academic Course
 Course Level: 2

 Course Status: State Board Approved
 Forade Level(s): 9,10,11,12

 Graduation Requirement: Equally Rigorous Science
 Science Science

iology (Grades 6-12)
hemistry (Grades 6-12)
hysics (Grades 6-12)
arth/Space Science (Grades 6-12)
cience (Secondary Grades 7-12)

Marine Science 2 Honors (#2002530) 2015 - 2022 (current)

Name	Description
SC.912.E.7.2:	Analyze the causes of the various kinds of surface and deep water motion within the oceans and their impacts on the transfer of energy between the poles and the equator.
SC.912.E.7.3:	Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.
SC.912.E.7.4:	Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans.
SC.912.E.7.5:	Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions.
SC.912.E.7.8:	Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually and collectively.
SC.912.E.7.9:	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.5:	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.
SC.912.L.17.7:	Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.
SC.912.L.17.10:	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:
	1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
SC 012 N 1 1	5. Plan investigations, (Design and evaluate a scientific investigation).
30.912.10.1.1.	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an
	organized way. Property use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	Set-up, calibration, technique, maintenance, and storage).
	Pose answers, explanations, or descriptions of events, Constant overland tions that evaluate or describe natural phonomena (inferences)
	Generate explanations that explicate or describe natural phenomena (interences), Jac appropriate outdones and reasoning to justify these explanations to others
	9. Use appropriate evidence and reasoning to justify mese explanations to others,
	10. Communicate results of sciencing investigations, and 11. Evolute the marits of the evolutions produced by others
	The Evaluate the method of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
	Describe instances in which scientists' varied backgrounds talents interests, and goals influence the inferences and thus the explanations that they
SC.912.N.2.5:	make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena: thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as
SC.912.N.4.2:	human, economic, and environmental.

SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.
SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.
LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LAFS.1112.RST.4.10:	By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.
LAFS.1112.SL.1.1:	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on
	a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.
	d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions
	when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
	Integrate multiple sources of information presented in diverse formate and media (e.g., visually, quantitatively, erally) in order to make informed
LAFS.1112.SL.1.2:	decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	evaluate a speaker's point of view, reasoning, and use of evidence and rnetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.1112.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.1112.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and

LAFS.1112.WHST.3.8:	limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.1112.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i>
	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima.
MAFS.912.F-IF.3.7:	 b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and
	amplitude, and using phase shift.
MAFS.912.G-MG.1.2:	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★ Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas;
MAES 012 N O 1 3	choose and interpret the scale and the origin in graphs and data displays.
MAFS.912.N-Q.1.3. MAFS.912.S-IC.2.6:	Evaluate reports based on data. *
	Represent data with plots on the real number line (dot plots, histograms, and box plots). ★
MAFS.912.S-ID.1.1:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ★
MAFS.912.S-ID.1.2:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). *
MAFS.912.S-ID.1.3:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. \star
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.
MAFS.912.S-ID.2.6:	 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association.
	Clarifications: Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting
MAFS.K12.MP.2.1:	Reason abstractly and quantitatively. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting

	Construct viable arguments and critique the reasoning of others.
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting Model with mathematics.
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
MAFS.K12.MP.8.1:	Look for and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
eld.kt2.ell.sc.1: Eld.k12.ell.sl.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science. English language learners communicate for social and instructional purposes within the school setting.

While the content focus of this course is consistent with the Marine Science 2 course, students will explore these concepts in greater depth. In general, the academic pace and rigor will be greatly increased for honors level course work. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education	
Course Number: 2002520	Courses > Grade Group: Grades 9 to 12 and Adult	
Course Number: 2002530	Education Courses > Subject: Science > SubSubject:	
	Marine Sciences >	
	Abbreviated Title: MARINE SCI 2 HON	
Number of Credits: One (1) credit	Course Length: Year (Y)	
	Course Attributes:	
	Honors	
Course Type: Core Academic Course	Course Level: 3	
Course Status: Course Approved		
Grade Level(s): 9,10,11,12		
Graduation Requirement: Equally Rigorous Science		

ology (Grades 6-12)	
emistry (Grades 6-12)	
ysics (Grades 6-12)	

Science (Secondary Grades 7-12)

Marine Science 2 Honors (#2002530) 2022 - And Beyond

Name	Description
SC.912.E.7.2:	Analyze the causes of the various kinds of surface and deep water motion within the oceans and their impacts on the transfer of energy between the poles and the equator.
SC.912.E.7.3:	Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.
SC.912.E.7.4:	Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans.
SC.912.E.7.5:	Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions.
SC.912.E.7.8:	Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually and collectively.
SC.912.E.7.9:	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.5:	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.
SC.912.L.17.7:	Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.
SC.912.L.17.10:	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence. (Examine whether available empirical evidence can be interpreted in terms of
SC.912.N.1.1:	 existing knowledge and models, and if not, modify or develop new models). 5. Plan investigations, (Design and evaluate a scientific investigation). 6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). 7. Pose answers, explanations, or descriptions of events,
50 010 N 1 0	 8. Generate explanations that explicate or describe natural phenomena (inferences), 9. Use appropriate evidence and reasoning to justify these explanations to others, 10. Communicate results of scientific investigations, and 11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of now similar investigations conducted in many parts or the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific interences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.

SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an
	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves
SC.912.P.10.20:	from one medium to another.
	Mathematicians who participate in effortful learning both individually and with others:
MA.K12.MTR.1.1:	Analyze the problem in a way that makes sense given the task.
	Ask questions that will help with solving the task.
	Build perseverance by modifying methods as needed while solving a challenging task.
	 Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach.
	Heip and support each other when attempting a new method or approach.
	Clarifications:
	Cultivate a community of growth mindset learners.
	 Foster perseverance in students by choosing tasks that are challenging.
	Develop students' ability to analyze and problem solve.
	Recognize students' effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways.
	Mathematicians who demonstrate understanding by representing problems in multiple ways:
	Build understanding through modeling and using manipulatives
	 Bailed and existing initiality initiality and using manipulatives. Represent solutions to problems in multiple ways using objects drawings tables graphs and equations
	 Progress from modeling problems with objects and drawings to using algorithms and equations.
	Express connections between concepts and representations.
MA.K12.MTR.2.1:	Choose a representation based on the given context or purpose.
	Clarifications:
	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:
	Help students make connections between concepts and representations.
	Provide opportunities for students to use manipulatives when investigating concepts.
	Guide students from concrete to pictorial to abstract representations as understanding progresses.
	Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency.
	Mathematicians who complete tasks with mathematical fluency:
	Select efficient and appropriate methods for solving problems within the given context.
	Maintain flexibility and accuracy while performing procedures and mental calculations.
	Complete tasks accurately and with confidence.
MA.K12.MTR.3.1:	Adapt procedures to apply them to a new context.
	Use reedback to improve efficiency when performing calculations.
	Clarifications:
	Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately
	 Offer multiple opportunities for students to practice efficient and generalizable methods.
	Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others
	Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
	Communicate mathematical ideas used by law and mathede offectively
	Contributicate mathematical theas, vocabulary and methods effectively. Analyze the mathematical thinking of others.
	 Compare the efficiency of a method to those expressed by others.
	Recognize errors and suggest how to correctly solve the task.
	Justify results by explaining methods and processes.
MA.K12.MTR.4.1:	Construct possible arguments based on evidence.
	Clarifications:
	Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:
	• Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.
	Create opportunities for students to discuss their thinking with peers.
	Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.
	Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts.
	Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
	Focus on relevant details within a problem.
	Create plans and procedures to logically order events, steps or ideas to solve problems.
	Decompose a complex problem into manageable parts.
	Relate previously learned concepts to new concepts.
MA.K12.MTR.5.1:	Look for similarities among problems.
	Connect solutions of problems to more complicated large-scale situations.
	Clarifications:
	Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts:
	the travente recognize the parterne in the next direction of the record and the next and connect these parterns to mathematical concepts.

	Support students to develop generalizations based on the similarities found among problems. Drovide expects place and precedures to solve problems.
	 Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions.
	Mathematicians who assess the reasonableness of solutions:
	 Estimate to discover possible solutions. Use henchmark quantities to determine if a solution makes sense.
	 Ose benchmark qualitaties to determine if a solution makes sense. Check calculations when solving problems.
	Verify possible solutions by explaining the methods used.
MA.K12.MTR.6.1:	Evaluate results based on the given context.
	Clarifications:
	 Have students estimate or predict solutions prior to solving.
	Prompt students to continually ask, "Does this solution make sense? How do you know?"
	Reinforce that students check their work as they progress within and after a task.
	Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts:
	Connect mathematical concepts to everyday experiences.
	Use models and methods to understand, represent and solve problems.
	 Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
MA.K12.MTR.7.1:	Clarifications:
	Teachers who encourage students to apply mathematics to real-world contexts:
	 Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to guestion the sequence of their models and matheds.
	 Chaining students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation.
	 Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	Clarifications:
	K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.
	2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In
ELA K12 EE 1 1.	3rd grade, students should use a combination of direct and indirect citations.
	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications:
	See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the
	girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and
	beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
	In kindergarten, students learn to listen to one another respectfully.
ELA.K12.EE.4.1:	In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The
	collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work.
	Clarifications:
	Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they
	must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
	Clarifications:
ECANTZIELUT.	In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends
	English language learners communicate information, ideas and concents practice appropriate success in the content area of Concent
	is a determined of the manual of the three and concepts necessary for addenic success in the content and of success in

GENERAL NOTES

While the content focus of this course is consistent with the Marine Science 2 course, students will explore these concepts in greater depth. In general, the academic pace and rigor will be greatly increased for honors level course work. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- · Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Graduation Requirement: Equally Rigorous Science

	Course Path: Section: Grades PreK to 12 Education
Course Number 2002520	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2002530	Education Courses > Subject: Science > SubSubject:
	Marine Sciences >
	Abbreviated Title: MARINE SCI 2 HON
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
Course Type: Core Academic Course	Course Level: 3
Course Status: State Board Approved	
Grade Level(s): 9,10,11,12	

page 711 of 926

Educator Certifications

Biology (Grades 6-12) Chemistry (Grades 6-12) Physics (Grades 6-12) Science (Secondary Grades 7-12)

Cambridge AICE Marine Science 2 A Level (#2002535) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-advanced/cambridge-international-as-and-alevels/curriculum/.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education	
Course Number: 2002525	Courses > Grade Group: Grades 9 to 12 and Adult	
Course Number. 2002000	Education Courses > Subject: Science > SubSubject:	
	Marine Sciences >	
	Abbreviated Title: AICE MARINE SCI 2 AL	
Number of Credits: One (1) credit	Course Length: Year (Y)	
	Course Attributes:	
	Advanced International Certificate of Education	
	(AICE)	
Course Type: Core Academic Course	Course Level: 3	
Course Status: Course Approved		
Grade Level(s): 9,10,11,12		
Graduation Requirement: Equally Rigorous Science		

cience (Secondary Grades 7-12)		
hemistry (Grades 6-12)		
arth/Space Science (Grades 6-12)		
liology (Grades 6-12)		
hysics (Grades 6-12)		

Solar Energy Honors (#2002540) 2015 - 2022 (current)

Name	Description
SC.912.E.5.4:	Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth.
SC.912.E.6.6:	Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies.
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
SC.912.E.7.2:	Analyze the causes of the various kinds of surface and deep water motion within the oceans and their impacts on the transfer of energy between the poles and the equator.
SC.912.E.7.9:	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.12:	Discuss the political, social, and environmental consequences of sustainable use of land.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
SC.912.L.17.17:	Assess the effectiveness of innovative methods of protecting the environment.
SC.912.L.17.18:	Describe how human population size and resource use relate to environmental quality.
SC.912.L.17.19:	Describe how different natural resources are produced and how their rates of use and renewal limit availability.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
SC.912.N.1.1:	 Pose questions about the natural world, (Afticulate the purpose of the investigation and identify the felevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical
SC.912.N.1.3:	thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific guestions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.8.12:	Describe the properties of the carbon atom that make the diversity of carbon compounds possible.
SC.912.P.8.13:	Identify selected functional groups and relate how they contribute to properties of carbon compounds.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.

SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.
SC.912.P.10.3:	Compare and contrast work and power qualitatively and quantitatively.
SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter.
SC.912.P.10.9:	Describe the quantization of energy at the atomic level.
LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LAFS.1112.RST.4.10:	By the end of grade 12, read and comprehend science/technical texts in the grades 11-12 text complexity band independently and proficiently.
LAFS.1112.SL.1.1:	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed.
	 c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.1112.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.1112.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.1112.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of
	ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
LAF5.1112.WH51.3.9:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of
LAFS.1112.WHST.4.10:	discipline-specific tasks, purposes, and audiences.
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i> ★ Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases ★
MAFS.912.F-IF.3.7:	 a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. \star
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star
MAFS.912.S-IC.2.6:	Evaluate reports based on data. *
MAFS.912.S-ID.1.1:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. \star
MAFS.912.S-ID.1.2:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). 🖈
MAFS.912.S-ID.1.3:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.2.6:	 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association.
	Clarifications: Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting
	Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
	Construct viable arguments and critique the reasoning of others.

MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting Model with mathematics
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression x^2 + 9x + 14, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results. Standard Relation to Course: Supporting
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all

students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2002540

Number of Credits: One (1) credit

Course Type: Elective Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Integrated Sciences > Abbreviated Title: SOLAR ENERGY HON Course Length: Year (Y) Course Attributes: • Honors Course Level: 3

Earth/Space Science (Grades 6-12)
Physics (Grades 6-12)
Biology (Grades 6-12)
Chemistry (Grades 6-12)

Solar Energy Honors (#2002540) 2022 - And Beyond

Name	Description
SC.912.E.5.4:	Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth.
SC.912.E.6.6:	Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies.
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
SC.912.E.7.2:	Analyze the causes of the various kinds of surface and deep water motion within the oceans and their impacts on the transfer of energy between the poles and the equator.
SC.912.E.7.9:	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.12:	Discuss the political, social, and environmental consequences of sustainable use of land.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
SC.912.L.17.17:	Assess the effectiveness of innovative methods of protecting the environment.
SC.912.L.17.18:	Describe how human population size and resource use relate to environmental quality.
SC.912.L.17.19:	Describe how different natural resources are produced and how their rates of use and renewal limit availability.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
SC.912.N.1.1:	 Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC 912 N 1 2.	Describe and explain what characterizes science and its methods
36.712.11.1.2.	Becomize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on, critical and logical
SC.912.N.1.3:	thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC 912 N 1 7	Recognize the role of creativity in constructing scientific questions, methods and explanations
SC 912 N 2 1	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science)
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.
	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and
SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.8.12:	Describe the properties of the carbon atom that make the diversity of carbon compounds possible.
SC.912.P.8.13:	Identify selected functional groups and relate how they contribute to properties of carbon compounds.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.

SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.
SC.912.P.10.3:	Compare and contrast work and power qualitatively and quantitatively.
SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter.
SC.912.P.10.9:	Describe the quantization of energy at the atomic level. Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach.
MA.K12.MTR.1.1:	Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications:
	 Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems.
-----------------	---
	 Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
	Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts:
	 Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
MA.K12.MTR.7.1:	Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. Clarifications: Soo Text Complexity for grade level complexity bands and a text complexity public
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends

	differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2002540

Number of Credits: One (1) credit

Course Type: Elective Course Course Status: State Board Approved Grade Level(s): 9,10,11,12 Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Integrated Sciences > Abbreviated Title: SOLAR ENERGY HON Course Length: Year (Y) Course Attributes: • Honors Course Level: 3

Educator Certifications

Earth/Space Science (Grades 6-12) Physics (Grades 6-12) Biology (Grades 6-12) Chemistry (Grades 6-12)

International Baccalaureate Marine Science 1 (#2002800) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2002800	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number. 2002000	Education Courses > Subject: Science > SubSubject:
	Marine Sciences >
	Abbreviated Title: IB MARINE SCI 1
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	International Baccalaureate (IB)
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Scienc	e

Chemistry (Grades 6-12)
Biology (Grades 6-12)
arth/Space Science (Grades 6-12)
Science (Secondary Grades 7-12)
Physics (Grades 6-12)

International Baccalaureate Marine Science 2 (#2002810) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

		Course Path: Section: Grades PreK to 12 Education
	Course Number: 2002810	Courses > Grade Group: Grades 9 to 12 and Adult
		Education Courses > Subject: Science > SubSubject:
		Marine Sciences >
		Abbreviated Title: IB MARINE SCI 2
	Number of Credits: One (1) credit	Course Length: Year (Y)
		Course Attributes:
		International Baccalaureate (IB)
	Course Type: Core Academic Course	Course Level: 3
	Course Status: Course Approved	
	Grade Level(s): 9,10,11,12	
	Graduation Requirement: Equally Rigorous Science	

Chemistry (Grades 6-12)	
Biology (Grades 6-12)	
Earth/Space Science (Grades 6-12)	
Science (Secondary Grades 7-12)	
Physics (Grades 6-12)	

Physical Science (#2003310) 2015 - 2022 (current)

Name	Description
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:
	1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
SC 012 N 1 1.	5. Plan investigations, (Design and evaluate a scientific investigation).
30.912.10.1.1.	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	set-up, calibration, technique, maintenance, and storage).
	 Pose answers, explanations, or descriptions of events, Concernent events and the transmission of descriptions of events,
	 Generate explanations that explicate or describe natural phenomena (interences), Use appropriate evidence and reasoning to justify these evidence to others.
	9. Ose appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and 11. Evaluate the marite of the explanations produced by others
	The Evaluate the ments of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC 912 N 1 3	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical
56.712.N.1.5.	thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as
CC 010 N 0 0.	questions addressed by other ways of knowing, such as art, philosophy, and religion.
30.912.11.2.3.	Explain that scientific knowledge is both durable and repust and open to change. Scientific knowledge can change because it is often examined and
SC 912 N 2 4	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger
00.712.11.2.1.	leading to its durability.
	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they
SC.912.N.2.5:	make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as
	they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC 912 N 3 1	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial
55.712.11.5.11	range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those
	relationships.
SC.912.N.3.4:	descriptions
SC 912 N 3 5	Describe the function of models in science, and identify the wide range of models used in science
SC 912 N 4 1	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making
	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as
SC.912.N.4.2:	human, economic, and environmental.
SC.912.P.8.1:	Differentiate among the four states of matter.
SC.912.P.8.2:	Differentiate between physical and chemical properties and physical and chemical changes of matter.
SC 012 D 0 4.	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons,
36.912.8.0.4:	and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC.912.P.8.5:	Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.
SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.
SC.912.P.8.8:	Characterize types of chemical reactions, for example: redox, acid-base, synthesis, and single and double replacement reactions.
SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.

SC.912.P.10.3:	Compare and contrast work and power qualitatively and quantitatively.
SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or
CC 010 D 10 F	states of matter.
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.
SC.912.P.10.7:	Distinguish between endothermic and exothermic chemical processes.
SC.912.P.10.10.	Compare the magnitude and range of the round indicatiental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).
SC 912 P 10 14	Differentiate among conductors, semiconductors, and insulators
SC 912 P 10 15	Investigate and explain the relationships among current voltage resistance and nower
00.712.1.110.10.	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength
SC.912.P.10.18:	frequency, and energy, and relate them to phenomena and applications.
SC.912.P.10.21.	Applyze the motion of an object in terms of its position valority and acceleration (with respect to a frame of reference) as functions of time.
SC 012 D 12 3	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.
SC 912 P 12 A	Describe how the gravitational force between two objects depends on their masses and the distance between them
SC.912.P.12.7:	Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving
SC 912 P 12 10.	Internet the hebavior of ideal cases in terms of kinetic molecular theory
SC 912 P 12 11	Describe phase transitions in terms of kinetic molecular theory
SC 912 P 12 12	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction
LAFS 910 RST 1 1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions
LAFS.910.RST.1.2:	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to
	special cases or exceptions defined in the text. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical
LAFS.910.RST.2.4:	context relevant to grades 9–10 texts and topics.
LAFS.910.RST.2.5:	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LAFS.910.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.RST.3.8:	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
LAFS.910.RST.3.9:	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support of
	contradict previous explanations or accounts.
LAFS.910.SL.1.1:	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.910.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

LAFS.910.WHST.1.2:	 c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.910.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most
LAFS.910.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
LAFS.910.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.910.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.910.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas;
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. *
MAFS.K12.MP.1.1: MAFS.K12.MP.2.1:	Make sense of problems and persevere in solving them. Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches. Standard Relation to Course: Supporting Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative leationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextua
MAFS.K12.MP.3.1:	Construct viable arguments and critique the reasoning of others. Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments. Standard Relation to Course: Supporting
MAFS.K12.MP.4.1:	Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose. Standard Relation to Course: Supporting
	Use appropriate tools strategically.
	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools

MAFS.K12.MP.5.1:	might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices: Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science,

and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGl/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION	
Course Number: 2003310	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Physical Sciences > Abbreviated Title: PHY SCI
Number of Credits: One (1) credit	Course Length: Year (Y)
Course Type: Core Academic Course	Course Level: 2
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Educator Certifications

Science (Secondary Grades 7-12) Earth/Space Science (Grades 6-12) Physics (Grades 6-12) Chemistry (Grades 6-12) Middle Grades General Science (Middle Grades 5-9)

Physical Science (#2003310) 2022 - And Beyond

derate ne following: pts). ships between rvations; erms of also the dence in an rs) including
derate he following: .pts). ships between rvations; erms of also the dence in an .rs) including
derate ne following: epts). ships between rvations; erms of also the dence in an ers) including
derate ne following: apts). ships between rvations; erms of also the dence in an ers) including
ne following: apts). Iships between rvations; erms of also the dence in an Irs) including
epts). Iships between rvations; erms of also the dence in an ars) including
Iships between rvations; erms of also the dence in an ars) including
rvations; erms of also the dence in an ers) including
erms of also the dence in an rs) including
erms of also the dence in an irs) including
erms of also the dence in an irs) including
also the dence in an ers) including
also the dence in an ers) including
also the dence in an ers) including
dence in an ers) including
ers) including
l and logical
0
such as
xamined and
nes stronger,
tiono that thou
tions that they
IT OF Science as
a a substantial
,
those
I supported
s, such as
s and electrons,
ו יו יו יו יו יו

SC.912.P.10.3:	Compare and contrast work and power qualitatively and quantitatively.	
SC 912 P 10 4	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or	
56.712.1.10.4.	states of matter.	
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.	
SC.912.P.10.7:	Distinguish between endothermic and exothermic chemical processes.	
SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).	
SC.912.P.10.12:	Differentiate between chemical and nuclear reactions.	
SC.912.P.10.14:	Differentiate among conductors, semiconductors, and insulators.	
SC.912.P.10.15:	Investigate and explain the relationships among current, voltage, resistance, and power.	
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.	
SC.912.P.10.21:	Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.	
SC.912.P.12.2:	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.	
SC.912.P.12.3:	Interpret and apply Newton's three laws of motion.	
SC.912.P.12.4:	Describe how the gravitational force between two objects depends on their masses and the distance between them.	
SC.912.P.12.7:	Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving.	
SC.912.P.12.10:	Interpret the behavior of ideal gases in terms of kinetic molecular theory.	
SC.912.P.12.11:	Describe phase transitions in terms of kinetic molecular theory.	
SC.912.P.12.12:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.	
	Mathematicians who participate in effortful learning both individually and with others:	
	 Analyze the problem in a way that makes sense given the task. 	
	 Ask questions that will help with solving the task. 	
	 Build perseverance by modifying methods as needed while solving a challenging task. 	
	 Stay engaged and maintain a positive mindset when working to solve tasks. 	
	 Help and support each other when attempting a new method or approach. 	
IVIA.N 12.IVITR.1.1.	Clarifications:	
	Teachers who encourage students to participate actively in effortful learning both individually and with others:	
	Cultivate a community of growth mindset learners.	
	Foster perseverance in students by choosing tasks that are challenging.	
	Develop students' ability to analyze and problem solve.	
	Recognize students' effort when solving challenging problems.	
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:	
	Build understanding through modeling and using manipulatives.	
	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. 	
	 Progress from modeling problems with objects and drawings to using algorithms and equations. 	
	Express connections between concepts and representations.	
MA.K12.MTR.2.1:	Choose a representation based on the given context or purpose.	
	Clarifications:	
	leachers who encourage students to demonstrate understanding by representing problems in multiple ways:	
	Help students make connections between concepts and representations.	
	Provide opportunities for students to use manipulatives when investigating concepts.	
	Guide students from concrete to pictorial to abstract representations as understanding progresses.	
	 Show students that various representations can have different purposes and can be useful in different situations. 	
	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:	
	 Select efficient and appropriate methods for solving problems within the given context. 	
	 Maintain flexibility and accuracy while performing procedures and mental calculations. 	
	Complete tasks accurately and with confidence.	
MA.K12.MTR.3.1:	 Adapt procedures to apply them to a new context. 	
	Use feedback to improve efficiency when performing calculations.	
	Clarifications:	
	Teachers who encourage students to complete tasks with mathematical fluency:	
	 Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. 	
	Offer multiple opportunities for students to practice efficient and generalizable methods.	
	Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.	
	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:	
	Communicate mathematical ideas, vocabulary and methods effectively	
	Analyze the mathematical thinking of others	
	Compare the efficiency of a method to those expressed by othere	
	Compare the entitlency of a method to those expressed by others. Perceptize errors and suggest how to correctly colve the task	
	Institutosulte by explaining methods and processes	
MA.K12.MTR.4.1:	Justify results by explaining memory and processes. Construct possible arguments based on evidence	
	Clarifications:	
	leacners who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:	

	 Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
MA.K12.MTR.5.1:	 Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts. Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems.
	Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	 Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
MA.K12.MTR.7.1:	Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	 Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. Clarifications:
	See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications:

ELA.K12.EE.4.1:	In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.	
	Use the accepted rules governing a specific format to create quality work.	
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.	
	Use appropriate voice and tone when speaking or writing.	
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.	
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.	
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.	

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices: Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGl/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Course Number: 2003310

Number of Credits: One (1) credit Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Physical Sciences > Abbreviated Title: PHY SCI Course Length: Year (Y) Course Level: 2

cience (Secondary Grades 7-12)
arth/Space Science (Grades 6-12)
Physics (Grades 6-12)
Chemistry (Grades 6-12)
/liddle Grades General Science (Middle Grades 5-9)

Physical Science Honors (#2003320) 2015 - 2022 (current)

Name	Description
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: 1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
	5. Plan investigations, (Design and evaluate a scientific investigation).
SC.912.N.1.1:	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	set-up, calibration, technique, maintenance, and storage).
	7. Pose answers, explanations, or descriptions of events,
	8. Generate explanations that explicate or describe natural phenomena (inferences),
	9. Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC 012 N 1 2	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical
36.712.11.1.3.	thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as
SC 012 N 2 2	duestions addressed by other ways of knowing, such as art, philosophy, and religion.
30.712.11.2.3.	Evolain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and
SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger.
	leading to its durability.
	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they
SC.912.N.2.5:	make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as
	they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial
60.010 N 0.0	range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships
	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported
SC.912.N.3.4:	descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.8.1:	Differentiate among the four states of matter.
SC.912.P.8.2:	Differentiate between physical and chemical properties and physical and chemical changes of matter.
SC 012 D 8 2	Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes
36.71Z.P.0.3.	were necessitated by experimental evidence.
SC.912.P.8.4:	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons,
	and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC.912.P.8.5:	Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.
SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.
SC.912.P.8.8:	Characterize types of chemical reactions, for example: redox, acid-base, synthesis, and single and double replacement reactions.

SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an
CO 010 D 10 0	isolated system is a conserved quantity.
3C.912.P.10.3:	Compare and contrast work and power qualitatively and quantitatively.
SC.912.P.10.4:	states of matter.
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.
SC.912.P.10.6:	Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum.
SC.912.P.10.7:	Distinguish between endothermic and exothermic chemical processes.
SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).
SC.912.P.10.11:	Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues.
SC.912.P.10.12:	Differentiate between chemical and nuclear reactions.
SC.912.P.10.14:	Differentiate among conductors, semiconductors, and insulators.
SC.912.P.10.15:	Investigate and explain the relationships among current, voltage, resistance, and power.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.10.21:	Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.
SC.912.P.12.1:	Distinguish between scalar and vector quantities and assess which should be used to describe an event.
SC.912.P.12.2:	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.
SC.912.P.12.3:	Interpret and apply Newton's three laws of motion.
SC.912.P.12.4:	Describe now the gravitational force between two objects depends on their masses and the distance between them.
SC.912.P.12.5.	Oualitatively apply the concept of angular momentum.
SC.912.P.12.7:	Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are
SC 912 P 12 10	Interpret the behavior of ideal gases in terms of kinetic molecular theory
SC.912.P.12.11:	Describe phase transitions in terms of kinetic molecular theory.
SC.912.P.12.12:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.
LAFS.910.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
LAFS.910.RST.1.2:	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.2.5:	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LAFS.910.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.RST.3.8:	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
LAFS.910.RST.3.9:	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
LAFS.910.RST.4.10:	 By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.
LAFS.910.SL.1.1:	 b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. Write arguments focused on <i>discipline-specific content</i> . a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence
	b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s)

LAFS.910.WHST.1.1:	 and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.910.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.910.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.910.WHST.2.6:	Use technology, including the internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
LAFS.910.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.910.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.910.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
MAFS.912.A-CED.1.4:	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law $V = IR$ to highlight resistance R .
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i>
MAFS.912.F-IF.3.7:	 cases. ★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.G-MG.1.2:	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star
MAFS.912.N-VM.1.1:	Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v , $ v $, $ v $, v).
MAFS.912.N-VM.1.3:	Solve problems involving velocity and other quantities that can be represented by vectors.
MAFS.912.S-ID.1.1:	Represent data with plots on the real number line (dot plots, histograms, and box plots). ★ Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.2:	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. * Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the
	characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.3:	Interpret differences in snape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). ★ Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. \star
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. \star Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. \star

MAFS.912.S-ID.2.6:	 a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association.
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting Reason abstractly and quantitatively
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting
MAFS.K12.MP.4.1:	Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

	Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

While the content focus of this course is consistent with the Physical Science course, students will explore these concepts in greater depth. In general, the academic pace and rigor will be greatly increased for honors level course work. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices: Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The course also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success The ELD standard should

specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2002220	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2003320	Education Courses > Subject: Science > SubSubject:
	Physical Sciences >
	Abbreviated Title: PHY SCI HON
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	

Educator Certifications

Graduation Requirement: Equally Rigorous Science

Science (Secondary Grades 7-12)	
Earth/Space Science (Grades 6-12)	
Physics (Grades 6-12)	
Chemistry (Grades 6-12)	
Middle Grades General Science (Middle Grades 5-9)	

Physical Science Honors (#2003320) 2022 - And Beyond

Name	Description
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: 1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
	5. Plan investigations, (Design and evaluate a scientific investigation).
SC.912.N.1.1:	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	set-up, calibration, technique, maintenance, and storage).
	7. Pose answers, explanations, or descriptions of events,
	8. Generate explanations that explicate or describe natural phenomena (inferences),
	9. Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC 912 N 1 3	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical
30.712.14.1.3.	thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC 012 N 2 2	duestions addressed by other ways of knowing, such as art, philosophy, and religion.
56.712.14.2.5.	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and
SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger,
	leading to its durability.
	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they
SC.912.N.2.5:	make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as
	they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial
SC 012 N 2 2	range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.IN.3.2:	Evolution that scientific laws are descriptions of specific relationships under given conditions in pature, but do not offer evolutions for those
SC.912.N.3.3:	relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported
	descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.8.1:	Differentiate among the four states of matter.
SC.912.P.8.2:	Differentiate between physical and chemical properties and physical and chemical changes of matter.
SC.912.P.8.3:	Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes were necessitated by experimental evidence.
SC.912.P.8.4:	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons,
	and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC.912.P.8.5:	Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.
SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.
SC.912.P.8.8:	Characterize types of chemical reactions, for example: redox, acid-base, synthesis, and single and double replacement reactions.

SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC 912 P 10 2	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an
00.712.1.10.2.	isolated system is a conserved quantity.
SC.912.P.10.3:	Compare and contrast work and power qualitatively and quantitatively.
SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter.
SC 912 P 10 5	Relate temperature to the average molecular kinetic energy
SC.912.P.10.6:	Create and interpret potential energy diagrams, for example; chemical reactions, orbits around a central body, motion of a pendulum.
SC.912.P.10.7:	Distinguish between endothermic and exothermic chemical processes.
SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).
SC.912.P.10.11:	Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues.
SC.912.P.10.12:	Differentiate between chemical and nuclear reactions.
SC.912.P.10.14:	Differentiate among conductors, semiconductors, and insulators.
SC.912.P.10.15:	Investigate and explain the relationships among current, voltage, resistance, and power.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.10.21:	Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.
SC.912.P.12.1:	Distinguish between scalar and vector quantities and assess which should be used to describe an event.
SC.912.P.12.2:	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.
SC.912.P.12.3:	Interpret and apply Newton's three laws of motion.
SC.912.P.12.4:	Describe how the gravitational force between two objects depends on their masses and the distance between them.
SC.912.P.12.3.	Apply the law of conservation of innear momentum to interactions, such as consistents between objects.
SC.912.P.12.7:	Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving.
SC.912.P.12.10:	Interpret the behavior of ideal gases in terms of kinetic molecular theory.
SC.912.P.12.11:	Describe phase transitions in terms of kinetic molecular theory.
SC.912.P.12.12:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.
MA.K12.MTR.1.1:	 Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach.
	 Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	 Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications:
	 Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.

	Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
NAA K12 NATE 4 1-	 Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes.
MA.K12.M1R.4.1:	Construct possible arguments based on evidence.
	 Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts.
MA.K12.MTR.5.1:	 Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations.
	 Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used.
VIA.K 12.VI1K.O.1:	 Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts:
	 Provide opportunities for students to apply mathematics to rearwork contexts. Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
EI & K12 FE 1 1.	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
LLM.N 12.LE. I. I.	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently

ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension.
	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing.
	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

While the content focus of this course is consistent with the Physical Science course, students will explore these concepts in greater depth. In general, the academic pace and rigor will be greatly increased for honors level course work. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices: Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

• Asking questions (for science) and defining problems (for engineering).

- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit

https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades Prek to 12 Education	
Course Number: 2002220	Courses > Grade Group: Grades 9 to 12 and Adult	
Course Number: 2003320	Education Courses > Subject: Science > SubSubject	
	Physical Sciences >	
	Abbreviated Title: PHY SCI HON	
Number of Credits: One (1) credit	Course Length: Year (Y)	
	Course Attributes:	
	Honors	
Course Type: Core Academic Course	Course Level: 3	
Course Status: State Board Approved		
Grade Level(s): 9,10,11,12		
Graduation Requirement: Equally Rigorous Science		

Science (Secondary Grades 7-12)
Earth/Space Science (Grades 6-12)
Physics (Grades 6-12)
Chemistry (Grades 6-12)
Middle Grades General Science (Middle Grades 5-9)

Cambridge Pre-AICE Physical Science IGCSE Level (#2003335) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-secondary-2/cambridge-igcse/curriculum/.

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2002225	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number. 2003535	Education Courses > Subject: Science > SubSubject:
	Physical Sciences >
	Abbreviated Title: PRE-AICE PHYS SCI IG
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Advanced International Certificate of Education
	(AICE)
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Science (Secondary Grades 7-12)	
Chemistry (Grades 6-12)	
Physics (Grades 6-12)	

Chemistry 1 (#2003340) 2015 - 2022 (current)

Name	Description
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models).
SC.912.N.1.1:	 Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.P.8.1:	Differentiate among the four states of matter.
SC.912.P.8.2:	Differentiate between physical and chemical properties and physical and chemical changes of matter.
SC.912.P.8.3:	Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes were necessitated by experimental evidence.
SC.912.P.8.4:	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC.912.P.8.5:	Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.
SC.912.P.8.6:	Distinguish between bonding forces holding compounds together and other attractive forces, including hydrogen bonding and van der Waals forces.
SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.
SC.912.P.8.8:	Characterize types of chemical reactions, for example: redox, acid-base, synthesis, and single and double replacement reactions.
SC.912.P.8.9:	Apply the mole concept and the law of conservation of mass to calculate quantities of chemicals participating in reactions.
SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.
SC.912.P.10.6:	Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum.
SC.912.P.10.7:	Distinguish between endothermic and exothermic chemical processes.
SU.912.P.10.9:	Describe the quantization of energy at the atomic level.
SC.912.P.10.12:	Differentiate between chemical and nuclear reactions.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.12.10:	Interpret the behavior of ideal gases in terms of kinetic molecular theory.
SC.912.P.12.11:	Describe phase transitions in terms of kinetic molecular theory.

SC.912.P.12.12:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.
SC.912.P.12.13:	Explain the concept of dynamic equilibrium in terms of reversible processes occurring at the same rates.
LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LAFS.1112.RST.4.10:	By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.
LAFS.1112.SL.1.1:	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11-12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study: explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed
LAFS.1112.SL.1.2:	decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.1112.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.1112.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.1112.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.1112.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i>
	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★ a. Graph linear and guadratic functions and show intercepts, maxima, and minima.
MAFS.912.F-IF.3.7:	 b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas;
MAFS.912.N-Q.1.3:	choose and interpret the scale and the origin in graphs and data displays. \star Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star
	Represent data with plots on the real number line (dot plots, histograms, and box plots). ★
MAFS.912.S-ID.1.1:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. \star
MAFS.912.S-ID.1.2:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
MAFS.912.S-ID.1.3:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. \star
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. \star
MAFS.912.S-ID.2.6:	 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association.
	Clarifications: Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others.
	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze

	situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from
MAFS.K12.MP.3.1:	which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting
	Model with mathematics.
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
MAFS.K12.MP.7.1:	Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression x ² + 9x + 14, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see
	complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others

using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION	
Course Number: 2003340	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Chemistry > Abbreviated Title: CHEM 1
Number of Credits: One (1) credit	Course Length: Year (Y)
Course Type: Core Academic Course	Course Level: 2
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Educator Certifications

Science (Secondary Grades 7-12)	
Chemistry (Grades 6-12)	

Equivalent Courses

2003350-Chemistry 1 Honors 2003800-Florida's Preinternational Baccalaureate Chemistry 1

Chemistry 1 (#2003340) 2022 - And Beyond

Name	Description
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation).
SC.912.N.1.1:	 6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). 7. Pose answers, explanations, or descriptions of events, 8. Generate explanations that explicate or describe natural phenomena (inferences), 9. Use appropriate evidence and reasoning to justify these explanations to others, 10. Communicate results of scientific investigations, and 11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.P.8.1:	Differentiate among the four states of matter.
SC.912.P.8.2:	Differentiate between physical and chemical properties and physical and chemical changes of matter.
SC.912.P.8.3:	Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes were necessitated by experimental evidence.
SC.912.P.8.4:	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC.912.P.8.5:	Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.
SC.912.P.8.6:	Distinguish between bonding forces holding compounds together and other attractive forces, including hydrogen bonding and van der Waals forces.
SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.
SC.912.P.8.8:	Characterize types of chemical reactions, for example: redox, acid-base, synthesis, and single and double replacement reactions.
SC.912.P.8.9:	Apply the mole concept and the law of conservation of mass to calculate quantities of chemicals participating in reactions.
SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.
SC.912.P.10.6:	Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum.
SC.912.P.10.7:	Distinguish between endothermic and exothermic chemical processes.
SC.912.P.10.9:	Describe the quantization of energy at the atomic level.
30.912.P.10.12:	Dimenentiate between chemical and nuclear reactions.
SC.912.P.10.18:	frequency, and energy, and relate them to phenomena and applications.
SC.912.P.12.10:	Interpret the behavior of ideal gases in terms of kinetic molecular theory.
SC.912.P.12.11:	Describe phase transitions in terms of kinetic molecular theory.

SC.912.P.12.12:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.
SC.912.P.12.13:	Explain the concept of dynamic equilibrium in terms of reversible processes occurring at the same rates.
	Mathematicians who participate in effortful learning both individually and with others:
	Analyze the problem in a way that makes sense given the task.
	 Ask questions that will help with solving the task. Duild personations by modificing methods so peeded while colving a shallonging task.
	 Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks.
	 Help and support each other when attempting a new method or approach.
MA.K12.MTR.1.1:	Clarifications
	Teachers who encourage students to participate actively in effortful learning both individually and with others:
	Cultivate a community of growth mindset learners.
	Foster perseverance in students by choosing tasks that are challenging.
	Develop students' ability to analyze and problem solve.
	Recognize students' effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways.
	Mathematicians who demonstrate understanding by representing problems in multiple ways:
	Build understanding through modeling and using manipulatives.
	Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
	 Progress from modeling problems with objects and drawings to using algorithms and equations. Evences connections between concents and conrespondations.
MΔ K12 MTR 2 1·	Choose a representation based on the given context or purpose
MART2.WITK.2.1.	Clarifications:
	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:
	Help students make connections between concepts and representations.
	Provide opportunities for students to use manipulatives when investigating concepts.
	Guide students from concrete to pictorial to abstract representations as understanding progresses.
	Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency.
	Mathematicians who complete tasks with mathematical fluency:
	Select efficient and appropriate methods for solving problems within the given context.
	Maintain flexibility and accuracy while performing procedures and mental calculations.
	Complete tasks accurately and with confidence.
MA.K12.MTR.3.1:	 Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations.
	Ose reedback to improve enciency when performing calculations.
	Clarifications:
	 Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
	Offer multiple opportunities for students to practice efficient and generalizable methods.
	• Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others.
	Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
	Communicate mathematical ideas, vocabulary and methods effectively.
	Analyze the mathematical thinking of others.
	Compare the efficiency of a method to those expressed by others.
	 Recognize errors and suggest how to correctly solve the task.
MA.K12.MTR.4.1:	Justify results by explaining methods and processes.
	Construct possible arguments based on evidence.
	Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:
	 Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.
	Create opportunities for students to discuss their thinking with peers.
	• Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.
	• Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts.
	Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
	Focus on relevant details within a problem.
MA.K12.MTR.5.1:	Create plans and procedures to logically order events, steps or ideas to solve problems.
	Decompose a complex problem into manageable parts.
	Relate previously learned concepts to new concepts.
	LOOK FOR Similarities among problems. Connect colutions of problems to more complicated large code situations
	Connect solutions of problems to more complicated large-scale situations.
	Clarifications: Teachers who encourage students to use natterns and structure to help understand and connect mathematical concents:
	 Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
	Support students to develop generalizations based on the similarities found among problems.
	Provide opportunities for students to create plans and procedures to solve problems.

	 Develop students ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
	Estimate to discover possible solutions.
	Use benchmark quantities to determine if a solution makes sense.
	Check calculations when solving problems.
	Verify possible solutions by explaining the methods used.
MA.K12.MTR.6.1:	Evaluate results based on the given context.
	Clarifications: Teachers who encourage students to assess the reasonableness of solutions:
	 Have students estimate or predict solutions prior to solving.
	Prompt students to continually ask, "Does this solution make sense? How do you know?"
	Reinforce that students check their work as they progress within and after a task.
	Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts:
	Connect mathematical concepts to everyday experiences.
	 Use models and methods to understand, represent and solve problems. Deferm investigations to gather data or determine if a method is appropriate a Bedesign models and methods to improve accuracy or
	• Perform investigations to gather data or determine in a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
MA.K12.MTR.7.1:	Clarifications:
	Teachers who encourage students to apply mathematics to real-world contexts:
	Provide opportunities for students to create models, both concrete and abstract, and perform investigations.
	 Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation.
	 Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	Clarifications:
	K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details
	from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.
	3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly
	quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications:
	See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
FLA K12 FF 3 1	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the
	girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and
	beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
	Clarifications:
	In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The
ELA.K12.EE.4.1:	collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accented rules governing a specific format to create quality work
	Clarifications:
ELA.K12.EE.5.1:	Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they
	must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to
	do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications:
	differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

н

1
GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

 Course Number: 2003340
 Course Path: Section: Grades PreK to 12 Education

 Courses > Grade Group: Grades 9 to 12 and Adult
 Education Courses > Subject: Science > SubSubject:

 Chemistry >
 Abbreviated Title: CHEM 1

 Number of Credits: One (1) credit
 Course Length: Year (Y)

 Course Status: State Board Approved
 Course Level: 2

 Grade Level(s): 9,10,11,12
 Faduation Requirement: Equally Rigorous Science

Educator Certifications

Science (Secondary Grades 7-12) Chemistry (Grades 6-12)

Equivalent Courses

2003350-Chemistry 1 Honors

2003800-Florida's Preinternational Baccalaureate Chemistry 1

Chemistry 1 for Credit Recovery (#2003345) 2015 - 2022 (current)

Name	Description
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:
	1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
	5. Plan investigations, (Design and evaluate a scientific investigation).
SC.912.N.1.1:	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	set-up, calibration, technique, maintenance, and storage).
	7. Pose answers, explanations, or descriptions of events,
	8. Generate explanations that explicate or describe natural phenomena (inferences),
	9. Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as
0017121112121	questions addressed by other ways of knowing, such as art, philosophy, and religion.
	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and
SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they
SC.912.N.2.5:	make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as
	they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.P.8.1:	Differentiate among the four states of matter.
SC.912.P.8.2:	Differentiate between physical and chemical properties and physical and chemical changes of matter.
SC.912.P.8.3:	Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes were necessitated by experimental evidence.
	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons
SC.912.P.8.4:	and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC.912.P.8.5:	Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.
SC.912.P.8.6:	Distinguish between bonding forces holding compounds together and other attractive forces, including hydrogen bonding and van der Waals forces.
SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.
SC.912.P.8.8:	Characterize types of chemical reactions, for example: redox, acid-base, synthesis, and single and double replacement reactions.
SC.912.P.8.9:	Apply the mole concept and the law of conservation of mass to calculate quantities of chemicals participating in reactions.
SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.
SC.912.P.10.6:	Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum.
SC.912.P.10.7:	Distinguish between endothermic and exothermic chemical processes.
SC.912.P.10.9:	Describe the quantization of energy at the atomic level.
SC.912.P.10.12:	Differentiate between chemical and nuclear reactions.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength,
	trequency, and energy, and relate them to phenomena and applications.
SC.912.P.12.10:	Interpret the behavior of ideal gases in terms of kinetic molecular theory.
SC.912.P.12.11:	Describe phase transitions in terms of kinetic molecular theory.

SC.912.P.12.12:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.
SC.912.P.12.13:	Explain the concept of dynamic equilibrium in terms of reversible processes occurring at the same rates.
LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LAFS.1112.RST.4.10:	By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.
LAFS.1112.SL.1.1:	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice,
	points of emphasis, and tone used.
LAFS.1112.SL.2.4:	alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.1112.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.1112.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.1112.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.1112.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences,
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i>
	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima.
MAFS.912.F-IF.3.7:	 b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas;
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★
	Represent data with plots on the real number line (dot plots, histograms, and box plots). ★
MAFS.912.S-ID.1.1:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. \star
MAFS.912.S-ID.1.2:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
MAFS.912.S-ID.1.3:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. \star
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. \star
MAFS.912.S-ID.2.6:	 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association.
	Clarifications: Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others.
	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze

	situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments that take into account the context from
MAFS.K12.MP.3.1:	which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting
MAFS.K12.MP.4.1:	Model with mathematics.Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.Standard Relation to Course: Supporting
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
MAFS.K12.MP.7.1:	Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression x ² + 9x + 14, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – 3(x – y) ² as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others

using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes: Credit Recovery courses are credit bearing courses with specific content requirements defined by Next Generation Sunshine State Standards and/or Florida Standards. Students enrolled in a Credit Recovery course must have previously attempted the corresponding course (and/or End-of-Course assessment) since the course requirements for the Credit Recovery course are exactly the same as the previously attempted corresponding course. For example, Geometry (1206310) and Geometry for Credit Recovery (1206315) have identical content requirements. It is important to note that Credit Recovery courses are not bound by Section 1003.436(1)(a), Florida Statutes, requiring a minimum of 135 hours of bona fide instruction (120 hours in a school/district implementing block scheduling) in a designed course of study that contains student performance standards, since the students have previously attempted successful completion of the corresponding course. Additionally, Credit Recovery courses should ONLY be used for credit recovery, grade forgiveness, or remediation for students needing to prepare for an End-of-Course assessment retake.

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades Prek to 12 Education
Course Number: 2002245	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2003345	Education Courses > Subject: Science > SubSubject:
	Chemistry >
	Abbreviated Title: CHEM 1 CR
Number of Credits: One (1) credit	Course Length: Credit Recovery (R)
Course Type: Credit Recovery	Course Level: 2
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	

Educator Certifications

Science (Secondary Grades 7-12)
Chemistry (Grades 6-12)

Name	Description
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an
	 organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). 7. Pose answers, explanations, or descriptions of events, 8. Generate explanations that explicate or describe natural phenomena (inferences), 9. Use appropriate evidence and reasoning to justify these explanations to others, 10. Communicate results of scientific investigations, and 11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.P.8.1:	Differentiate among the four states of matter.
SC.912.P.8.2:	Differentiate between physical and chemical properties and physical and chemical changes of matter.
SC.912.P.8.3:	Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes were necessitated by experimental evidence.
SC.912.P.8.4:	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC.912.P.8.5:	Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.
SC.912.P.8.6:	Distinguish between bonding forces holding compounds together and other attractive forces, including hydrogen bonding and van der Waals forces.
SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.
SC.912.P.8.8:	Characterize types of chemical reactions, for example: redox, acid-base, synthesis, and single and double replacement reactions.
SC.912.P.8.9:	Apply the mole concept and the law of conservation of mass to calculate quantities of chemicals participating in reactions.
SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.
SC.912.P.10.6:	Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum.
SC.912.P.10.7:	Distinguish between endothermic and exothermic chemical processes.
SC 012 D 10 12	Describe the qualitization of energy at the atomic level.
36.912.P.10.12:	Evolore the theory of electromagnetism by comparing and contracting the different parts of the electromagnetic speatrum is target of usual and the
SC.912.P.10.18:	frequency, and energy, and relate them to phenomena and applications.
SC.912.P.12.10:	Interpret the behavior of ideal gases in terms of kinetic molecular theory.
SC.912.P.12.11:	Describe phase transitions in terms of kinetic molecular theory.

SC.912.P.12.12:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.
SC.912.P.12.13:	Explain the concept of dynamic equilibrium in terms of reversible processes occurring at the same rates.
	Mathematicians who participate in effortful learning both individually and with others:
	Analyze the problem in a way that makes sense given the task.
	Ask questions that will help with solving the task.
	Build perseverance by modifying methods as needed while solving a challenging task.
	 Stay engaged and maintain a positive minuset when working to solve tasks. Help and support each other when attempting a new method or approach.
MA.K12.MTR.1.1:	
	Clarifications:
	 Cultivate a community of growth mindset learners.
	Foster perseverance in students by choosing tasks that are challenging.
	Develop students' ability to analyze and problem solve.
	Recognize students' effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways.
	Mathematicians who demonstrate understanding by representing problems in multiple ways:
	Build understanding through modeling and using manipulatives.
	Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
	 Progress from modeling problems with objects and drawings to using algorithms and equations.
	Express connections between concepts and representations.
MA.K12.MTR.2.1:	Choose a representation based on the given context or purpose.
	Clarifications:
	leachers who encourage students to demonstrate understanding by representing problems in multiple ways:
	 Replay the provide opportunities for students to use manipulatives when investigating concepts
	 Guide students from concrete to pictorial to abstract representations as understanding progresses.
	 Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency
	Mathematicians who complete tasks with mathematical fluency:
	Select efficient and appropriate methods for solving problems within the given context
	 Maintain flexibility and accuracy while performing procedures and mental calculations.
	Complete tasks accurately and with confidence.
	Adapt procedures to apply them to a new context.
MA.K12.MTR.3.1:	Use feedback to improve efficiency when performing calculations.
	Clarifications:
	Teachers who encourage students to complete tasks with mathematical fluency:
	Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
	Other multiple opportunities for students to practice efficient and generalizable methods. Provide expectivities for students to reflect an the method they used and determine if a metro efficient method exuel have been used.
	Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
	Communicate mathematical ideas susceptulary and methods affectively
	Communicate mathematical ideas, vocabulary and methods enectively. Analyze the mathematical thinking of others
	 Compare the efficiency of a method to those expressed by others.
	Recognize errors and suggest how to correctly solve the task.
	Justify results by explaining methods and processes.
MA.K12.MIR.4.1:	Construct possible arguments based on evidence.
	Clarifications:
	Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:
	 Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.
	 Create opportunities for students to discuss their thinking with peers. Select sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.
	 Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Lise natterns and structure to help understand and connect mathematical concents
MA.K12.MTR.5.1:	Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
	Eocus on relevant details within a problem
	Create plans and procedures to logically order events, steps or ideas to solve problems.
	Decompose a complex problem into manageable parts.
	Relate previously learned concepts to new concepts.
	Look for similarities among problems.
	Connect solutions of problems to more complicated large-scale situations.
	Clarifications:
	Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:
	 Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop approximations based on the similarities found among problems.
	 Support students to develop generalizations based on the similarities round among problems. Provide opportunities for students to create plans and procedures to solve problems.

	 Develop students ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
	Estimate to discover possible solutions.
	Use benchmark quantities to determine if a solution makes sense.
	Check calculations when solving problems.
	 Verify possible solutions by explaining the methods used. Evaluate results based on the given context
	Teachers who encourage students to assess the reasonableness of solutions:
	Have students estimate or predict solutions prior to solving.
	Prompt students to continually ask, "Does this solution make sense? How do you know?"
	 Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts.
	Mathematicians who apply mathematics to real-world contexts:
	 Connect mathematical concepts to everyday experiences. Use models and methods to understand, concepts and colve problems.
	 Ose models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or
	efficiency.
IVIA.K 12.IVITR.7.1:	Clarifications:
	Teachers who encourage students to apply mathematics to real-world contexts:
	 Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods.
	 Support students as they validate conclusions by comparing them to the given situation.
	Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	Clarifications:
	K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing
	2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In
	3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly
	quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6.8 Students continue with previous skills and use a style guide to create a proper citation
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
	Clarifications:
ELA.K12.EE.3.1:	Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the
	girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations
ELA.K12.EE.4.1:	Clarifications:
	In kindergarten, students learn to listen to one another respectfully.
	In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work.
	Clarifications:
	must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to
	do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications:
FLD.K12.FLL.SC.1:	In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

н

1

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes: Credit Recovery courses are credit bearing courses with specific content requirements defined by Next Generation Sunshine State Standards and/or Florida Standards. Students enrolled in a Credit Recovery course must have previously attempted the corresponding course (and/or End-of-Course assessment) since the course requirements for the Credit Recovery course are exactly the same as the previously attempted corresponding course. For example, Geometry (1206310) and Geometry for Credit Recovery (1206315) have identical content requirements. It is important to note that Credit Recovery courses are not bound by Section 1003.436(1)(a), Florida Statutes, requiring a minimum of 135 hours of bona fide instruction (120 hours in a school/district implementing block scheduling) in a designed course of study that contains student performance standards, since the students have previously attempted successful completion of the corresponding course. Additionally, Credit Recovery courses should ONLY be used for credit recovery, grade forgiveness, or remediation for students needing to prepare for an End-of-Course assessment retake.

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2003345

Number of Credits: One (1) credit Course Type: Credit Recovery Course Status: State Board Approved Grade Level(s): 9,10,11,12 Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Chemistry > Abbreviated Title: CHEM 1 CR Course Length: Credit Recovery (R) Course Level: 2 Science (Secondary Grades 7-12) Chemistry (Grades 6-12)

Chemistry 1 Honors (#2003350) 2015 - 2022 (current)

Name	Description
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.
SC.912.L.17.19:	Describe how different natural resources are produced and how their rates of use and renewal limit availability.
SC 912 L 18 12	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate
	temperature, expansion upon freezing, and versatility as a solvent.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:
	1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
CO 010 N 1 1	5. Plan investigations, (Design and evaluate a scientific investigation).
SC.912.N.1.1:	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	set-up, calibration, technique, maintenance, and storage).
	7. Pose answers, explanations, or descriptions of events,
	8. Generate explanations that explicate or describe natural phenomena (inferences),
	9. Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
60.040 N 0.0	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as
SC.912.N.2.2:	questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.
	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and
SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger,
	Describe instances in which scientists' varied backgrounds talents interests and goals influence the inferences and thus the evaluations that they
SC 912 N 2 5	make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as
00.712.11.2.0.	they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial
SC.912.N.3.1:	range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
CC 012 N 2 2	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those
30.912.10.3.3:	relationships.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC 912 N 4 2 [.]	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as
00.712.10.1.2.	human, economic, and environmental.
SC.912.P.8.1:	Differentiate among the four states of matter.
SC.912.P.8.2:	Differentiate between physical and chemical properties and physical and chemical changes of matter.
SC.912.P.8.3:	Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes
	were necessitated by experimental evidence.
SC.912.P.8.4:	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons,
	and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC.912.P.8.5:	Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.
SC.912.P.8.6:	Distinguish between bonding forces holding compounds together and other attractive forces, including hydrogen bonding and van der waais forces.
SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.
SU.912.P.8.8:	Unaracterize types or chemical reactions, for example: redox, acid-base, synthesis, and single and double replacement reactions.
SC.912.P.8.9:	Apply the mole concept and the law or conservation of mass to calculate quantities of chemicals participating in reactions.
SU.912.P.8.10:	Describe oxidation-reduction reactions in living and hon-living systems.
SC.912.P.8.11:	Relate actains and basicity to hydronium and hydroxyl ion concentration and pH.
SU.912.P.8.12:	Describe the properties of the carbon atom that make the diversity of carbon compounds possible.
SC.912.P.8.13:	identity selected functional groups and relate now they contribute to properties of carbon compounds.

SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an
SC 012 D 10 E	Isolated system is a conserved quantity.
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.
SC 912 P 10 7	Distinguish between endothermic and exothermic chemical processes
SC.912.P.10.8:	Explain entropy's role in determining the efficiency of processes that convert energy to work.
SC.912.P.10.9:	Describe the quantization of energy at the atomic level.
SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).
SC.912.P.10.11:	Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues.
SC.912.P.10.12:	Differentiate between chemical and nuclear reactions.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.12.10:	Interpret the behavior of ideal gases in terms of kinetic molecular theory.
SC.912.P.12.11:	Describe phase transitions in terms of kinetic molecular theory.
SC.912.P.12.12:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.
SC.912.P.12.13:	Explain the concept of dynamic equilibrium in terms of reversible processes occurring at the same rates.
LAFS.910.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
LAFS.910.RST.1.2:	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.2.5:	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LAFS.910.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.RST.3.8:	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
LAFS.910.RST.3.9:	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
LAFS.910.SL.1.1:	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.SL.2.5:	 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s)
LAFS.910.WHST.1.1:	 and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.910.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts.

	d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and
	context as well as to the expertise of likely readers.
	e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
	or the significance of the topic)
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.910.WHST.2.5:	significant for a specific purpose and audience.
LAFS.910.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
LAFS.910.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.910.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.910.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. \bigstar
	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★
	a. Graph linear and quadratic functions and show intercepts, maxima, and minima.
MAFS.912 F-IF 3 7	b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
MAL 3. 7 12.1 - 11 . 3. 7 .	c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.
	 Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. Craph exponential and logarithmic functions, showing intercents and end behavior, and trigonometric functions, showing period, midline, and
	amplitude, and using phase shift.
MAFS.912.G-MG.1.2:	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. \star
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★
MAFS.912.S-IC.2.6:	Evaluate reports based on data. ★
	Represent data with plots on the real number line (dot plots, histograms, and box plots). ★
MAFS.912.S-ID.1.1:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ★
MAFS.912.S-ID.1.2:	Clarifications:
	In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). \star
MAFS 912 S-ID 1 3 [.]	Clarifications:
	In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are
	data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. \star
MAFS.912.S-ID.2.5:	marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.
	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. \star
	a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function
	suggested by the context. Emphasize linear, and exponential models.
	c. Fit a linear function for a scatter plot that suggests a linear association.
MAFS.912.S-ID.2.6:	
	Clarifications
	Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.
	Make sense of problems and persevere in solving them.
	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution
	pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students
MAFS.K12.MP.1.1:	thight, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and

	graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others.
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting Model with mathematics.
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
MAFS.K12.MP.6.1:	Attend to precision. Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions. Standard Pelation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a

	problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.	
	Standard Relation to Course: Supporting	
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.	
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.	

GENERAL NOTES

While the content focus of this course is consistent with the Chemistry I course, students will explore these concepts in greater depth. In general, the academic pace and rigor will be greatly increased for honors level course work. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices:

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGl/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Course Number: 2003350

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Chemistry > Number of Credits: One (1) credit

Abbreviated Title: CHEM 1 HON Course Length: Year (Y) Course Attributes: • Honors Course Level: 3

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Educator Certifications

Science (Secondary Grades 7-12)	
Chemistry (Grades 6-12)	

Equivalent Courses

2003340-Chemistry 1

2003800-Florida's Preinternational Baccalaureate Chemistry 1

Chemistry 1 Honors (#2003350) 2022 - And Beyond

Name	Description	
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.	
SC.912.L.17.19:	Describe how different natural resources are produced and how their rates of use and renewal limit availability.	
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.	
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: 1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).	
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between	
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;	
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).	
	3. Examine books and other sources of information to see what is already known,	
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of	
	existing knowledge and models, and if not, modify or develop new models).	
	5. Plan investigations, (Design and evaluate a scientific investigation).	
SC.912.N.1.1:	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the	
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an	
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including	
	set-up, calibration, technique, maintenance, and storage).	
	7. Pose answers, explanations, or descriptions of events,	
	8. Generate explanations that explicate or describe natural phenomena (inferences),	
	9. Use appropriate evidence and reasoning to justify these explanations to others,	
	10. Communicate results of scientific investigations, and	
	11. Evaluate the merits of the explanations produced by others.	
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.	
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.	
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.	
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.	
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.	
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as	
SC 012 N 2 2	questions addressed by other ways of knowing, such as art, philosophy, and religion.	
30.912.11.2.3.	Explain that scientific knowledge is both durable and repurct and energies change. Scientific knowledge can change because it is often examined and	
SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.	
	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they	
SC.912.N.2.5:	make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as	
	they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.	
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.	
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.	
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.	
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.	
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.	
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.	
SC.912.P.8.1:	Differentiate among the four states of matter.	
SC.912.P.8.2:	Differentiate between physical and chemical properties and physical and chemical changes of matter.	
SC.912.P.8.3:	Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes were necessitated by experimental evidence.	
SC.912.P.8.4:	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.	
SC.912.P.8.5;	Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.	
SC.912.P.8.6:	Distinguish between bonding forces holding compounds together and other attractive forces, including hydrogen bonding and van der Waals forces.	
SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.	
SC.912.P.8.8:	Characterize types of chemical reactions, for example: redox, acid-base, synthesis, and single and double replacement reactions.	
SC.912.P.8.9:	Apply the mole concept and the law of conservation of mass to calculate quantities of chemicals participating in reactions.	
SC.912.P.8.10:	Describe oxidation-reduction reactions in living and non-living systems.	
SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.	
SC.912.P.8.12:	Describe the properties of the carbon atom that make the diversity of carbon compounds possible.	
SC.912.P.8.13:	Identify selected functional groups and relate how they contribute to properties of carbon compounds.	

SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.	
CC 012 D 10 2	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an	
50.912.P.10.2:	isolated system is a conserved quantity.	
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.	
SC.912.P.10.6:	Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum.	
SC.912.P.10.7:	Distinguish between endothermic and exothermic chemical processes.	
SC.912.P.10.8:	Explain entropy's role in determining the efficiency of processes that convert energy to work.	
SC.912.P.10.9:	Describe the quantization of energy at the atomic level.	
SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).	
SC.912.P.10.11:	Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues.	
SC.912.P.10.12:	Differentiate between chemical and nuclear reactions.	
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.	
SC.912.P.12.10:	Interpret the behavior of ideal gases in terms of kinetic molecular theory.	
SC.912.P.12.11:	Describe phase transitions in terms of kinetic molecular theory.	
SC.912.P.12.12:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.	
SC.912.P.12.13:	Explain the concept of dynamic equilibrium in terms of reversible processes occurring at the same rates.	
	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. 	
	Help and support each other when attempting a new method or approach.	
MA.K12.MTR.1.1:	Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.	
MA.K12.MTR.2.1:	 Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. 	
	 Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations. 	
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations.	
	 Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used. 	
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: 	
	 Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. 	

	 Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
MA.K12.MTR.5.1:	 Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
	 Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems
MA.K12.MTR.6.1:	 Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
	Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
	Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
	 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. Clarifications:
ELA.K12.EE.3.1:	See Text complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and bound
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully.

ELA.K12.EE.4.1:	In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

While the content focus of this course is consistent with the Chemistry I course, students will explore these concepts in greater depth. In general, the academic pace and rigor will be greatly increased for honors level course work. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices:

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html?

Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Course Number: 2003350

Number of Credits: One (1) credit

Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Chemistry > Abbreviated Title: CHEM 1 HON Course Length: Year (Y) Course Attributes: • Honors Course Level: 3

Educator Certifications

Science (Secondary Grades 7-12) Chemistry (Grades 6-12)

Equivalent Courses

2003340-Chemistry 1

2003800-Florida's Preinternational Baccalaureate Chemistry 1

Chemistry 2 Honors (#2003360) 2015 - 2022 (current)

Name	Description	
SC.912.L.17.17:	Assess the effectiveness of innovative methods of protecting the environment.	
SC.912.L.17.19:	Describe how different natural resources are produced and how their rates of use and renewal limit availability.	
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.	
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.	
SC.912.L.18.2:	Describe the important structural characteristics of monosaccharides, disaccharides, and polysaccharides and explain the functions of carbohydrates in living things.	
SC.912.L.18.3:	Describe the structures of fatty acids, triglycerides, phospholipids, and steroids. Explain the functions of lipids in living organisms. Identify some reactions that fatty acids undergo. Relate the structure and function of cell membranes.	
SC.912.L.18.4:	Describe the structures of proteins and amino acids. Explain the functions of proteins in living organisms. Identify some reactions that amino acids undergo. Relate the structure and function of enzymes.	
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.	
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.	
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others. 	
	The Evaluate the ments of the explanations produced by others.	
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.	
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.	
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.	
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.	
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.	
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.	
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).	
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.	
SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.	
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.	
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.	
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.	
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.	
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.	
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.	
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.	
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.	
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.	
SC.912.P.8.10:	Describe oxidation-reduction reactions in living and non-living systems.	

SC.912.P.8.12:	Describe the properties of the carbon atom that make the diversity of carbon compounds possible.		
SC.912.P.8.13:	Identify selected functional groups and relate how they contribute to properties of carbon compounds.		
SC.912.P.10.6:	Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum.		
SC.912.P.10.8:	Explain entropy's role in determining the efficiency of processes that convert energy to work. Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps		
LAFS.1112.RST.1.1:	or inconsistencies in the account.		
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.		
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.		
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.		
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.		
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.		
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.		
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.		
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.		
LAFS.1112.RST.4.10:	By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.		
LAFS.1112.SL.1.1:	 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task. 		
	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed		
LAFS.1112.SL.1.2:	decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.		
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.		
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tacks.		
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.		
LAFS.1112.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented. 		
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic). 		
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.		
LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.		
LAFS.1112.WHST.2.6:	Use technology, including the internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.		
LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate: synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation		

LAFS.1112.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.	
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.	
LAFS.1112.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i>	
MAFS.912.F-IF.3.7:	 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift. 	
MAFS.912.G-MG.1.2:	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). 🛨	
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★	
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star	
MAFS.912.S-IC.2.6:	Evaluate reports based on data. ★	
	Represent data with plots on the real number line (dot plots, histograms, and box plots). ★	
MAFS.912.S-ID.1.1:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.	
	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ★	
MAFS.912.S-ID.1.2:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.	
	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). ★	
MAFS.912.S-ID.1.3:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.	
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. \star	
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. \star	
MAFS.912.S-ID.2.6:	 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association. 	
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.	
	Standard Relation to Course: Supporting Reason abstractly and quantitatively.	
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.	

	Standard Relation to Course: Supporting
	Construct viable arguments and critique the reasoning of others.
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting
	Model with mathematics.
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
eld.kt2.ell.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices: Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2002240	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2003360	Education Courses > Subject: Science > SubSubject:
	Chemistry >
	Abbreviated Title: CHEM 2 HON
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Educator Certifications

Science (Secondary Grades 7-12)	
Chemistry (Grades 6-12)	

Chemistry 2 Honors (#2003360) 2022 - And Beyond

Name	Description
SC.912.L.17.17:	Assess the effectiveness of innovative methods of protecting the environment.
SC.912.L.17.19:	Describe how different natural resources are produced and how their rates of use and renewal limit availability.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.2:	Describe the important structural characteristics of monosaccharides, disaccharides, and polysaccharides and explain the functions of carbohydrates in living things.
SC.912.L.18.3:	Describe the structures of fatty acids, triglycerides, phospholipids, and steroids. Explain the functions of lipids in living organisms. Identify some reactions that fatty acids undergo. Relate the structure and function of cell membranes.
SC.912.L.18.4:	Describe the structures of proteins and amino acids. Explain the functions of proteins in living organisms. Identify some reactions that amino acids undergo. Relate the structure and function of enzymes.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by
	The Evaluate the ments of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.8.10:	Describe oxidation-reduction reactions in living and non-living systems.

SC.912.P.8.12:	Describe the properties of the carbon atom that make the diversity of carbon compounds possible.
SC.912.P.8.13:	Identify selected functional groups and relate how they contribute to properties of carbon compounds.
SC.912.P.10.6:	Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum.
SC.912.P.10.8:	Explain entropy's role in determining the efficiency of processes that convert energy to work.
	Mathematicians who participate in effortful learning both individually and with others:
	Analyze the problem in a way that makes sense given the task.
	 Ask questions that will help with solving the task. Build perseverance by medifying methods as peeded while solving a shallonging task.
	Stavengaged and maintain a positive mindset when working to solve tasks
	 Help and support each other when attempting a new method or approach.
MA.K12.MTR.1.1:	
	Teachers who encourage students to participate actively in effortful learning both individually and with others:
	Cultivate a community of growth mindset learners.
	Foster perseverance in students by choosing tasks that are challenging.
	Develop students' ability to analyze and problem solve.
	Recognize students' effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways.
	Mathematicians who demonstrate understanding by representing problems in multiple ways:
	Build understanding through modeling and using manipulatives.
	Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
	 Progress from modeling problems with objects and drawings to using algorithms and equations.
	Express connections between concepts and representations.
MA.K12.MTR.2.1:	Choose a representation based on the given context or purpose.
	Clarifications:
	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:
	Help students make connections between concepts and representations.
	Provide opportunities for students to use manipulatives when investigating concepts.
	 Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that verious representations can have different surpasses and can be useful in different situations.
	• Show students that various representations can have different purposes and can be userd in different situations.
	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:
	Select efficient and appropriate methods for solving problems within the given context.
	Maintain nexibility and accuracy while performing procedures and mental calculations.
	Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context.
MA.K12.MTR.3.1:	Use feedback to improve efficiency when performing calculations.
	Clarifications
	Teachers who encourage students to complete tasks with mathematical fluency:
	• Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
	Offer multiple opportunities for students to practice efficient and generalizable methods.
	• Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others.
	Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
	Communicate mathematical ideas, vocabulary and methods effectively.
	Analyze the mathematical thinking of others.
	 Compare the efficiency of a method to those expressed by others.
	 Recognize errors and suggest how to correctly solve the task.
MA.K12.MTR.4.1:	Justify results by explaining methods and processes.
	Construct possible arguments based on evidence.
	Clarifications:
	Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning
	Create opportunities for students to discuss their thinking with peers
	 Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.
	• Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts.
	Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
	Focus on relevant details within a problem.
	Create plans and procedures to logically order events, steps or ideas to solve problems
	Decompose a complex problem into manageable parts.
	Relate previously learned concepts to new concepts.
	Look for similarities among problems.
IVIA.KT2.MTR.5.1:	Connect solutions of problems to more complicated large-scale situations.
	Clarifications:
	Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:
	 Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.

	 Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. 	
	• Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.	
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:	
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. 	
	Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.	
	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. 	
MA.K12.MTR.7.1:	Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.	
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning.	
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.	
	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.	
	6-8 Students continue with previous skills and use a style guide to create a proper citation.	
	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.	
	Read and comprehend grade-level complex texts proficiently.	
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.	
	Make inferences to support comprehension.	
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.	
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.	
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.	
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.	
	Use the accepted rules governing a specific format to create quality work.	
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.	
	Use appropriate voice and tone when speaking or writing.	
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.	
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.	

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices: Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- · Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Graduation Requirement: Equally Rigorous Science

	Course Path: Section: Grades Prek to 12 Education
Course Number: 2002260	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2003360	Education Courses > Subject: Science > SubSubject:
	Chemistry >
	Abbreviated Title: CHEM 2 HON
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
Course Type: Core Academic Course	Course Level: 3
Course Status: State Board Approved	
Grade Level(s): 9,10,11,12	

page 789 of 926

Educator Certifications

Science (Secondary Grades 7-12) Chemistry (Grades 6-12)

Equivalent Courses

2003820-Chemistry 3-International Baccalaureate

Pre-Advanced Placement Chemistry (#2003365) 2020 - And

Beyond (current)

General Course Information and Notes

GENERAL NOTES

The course description for this Pre-Advanced Placement (Pre-AP) course is located on the College Board site at https://pre-ap.collegeboard.org/courses.

GENERAL INFORMATION

Course Number: 2003365

Number of Credits: One (1) credit

Course Type: Elective Course Course Status: Course Approved Grade Level(s): 9 Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Chemistry > Abbreviated Title: PRE-AP CHEMISTRY Course Length: Year (Y) Course Attributes: • Advanced Placement (AP) Course Level: 3

Educator Certifications

Chemistry (Grades 6-12) Science (Secondary Grades 7-12)

Advanced Placement Chemistry (#2003370) 2014 - And Beyond

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult

Education Courses > Subject: Science > SubSubject:

(current)

General Course Information and Notes

GENERAL NOTES

The course description for this Advanced Placement courses is located on the College Board site at http://apcentral.collegeboard.com/apc/public/courses/teachers_corner/index.html.

Chemistry >

Course Level: 3

Abbreviated Title: AP CHEM

Advanced Placement (AP)

Course Length: Year (Y) Course Attributes:

GENERAL INFORMATION

Course Number: 2003370

Number of Credits: One (1) credit

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Educator Certifications

Science (Secondary Grades 7-12)	
Chemistry (Grades 6-12)	

Equivalent Courses

2003371-Cambridge AICE Chemistry 1 AS Level
Cambridge AICE Chemistry 1 AS Level (#2003371) 2014.

And Beyond (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-advanced/cambridge-international-as-and-a-levels/curriculum/.

GENERAL INFORMATION	
Course Number: 2003371	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Chemistry >
Number of Credits: One (1) credit	Abbreviated Title: AICE CHEM 1 AS Course Length: Year (Y) Course Attributes:
	 Advanced International Certificate of Education (AICE)
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous So	cience

Educator Certifications

Science (Secondary Grades 7-12)	
Chemistry (Grades 6-12)	

Equivalent Courses

2003370-Advanced Placement Chemistry

Cambridge Pre-AICE Chemistry IGCSE Level (#2003372) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-secondary-2/cambridge-igcse/curriculum/.

GENERAL INFORMATION	
Course Number: 2003372	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Chemistry >
Number of Credits: One (1) credit	Abbreviated Title: PRE-AICE CHEM IG
Number of creats. One (1) creat	Course Attributes: Advanced International Certificate of Education
	(AICE)
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Se	cience

Science (Secondary Grades 7-12)	
Chemistry (Grades 6-12)	

Cambridge AICE Chemistry 2 A Level (#2003373) 2014 - And

Beyond (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-advanced/cambridge-international-as-and-a-levels/curriculum/.

GENERAL INFORMATION	
Course Number: 2003373	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Chemistry >
Number of Credits: One (1) credit	Abbreviated Title: AICE CHEM 2 AL Course Length: Year (Y) Course Attributes: • Advanced International Certificate of Education
Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science	(AICE) Course Level: 3

Science (Secondary Grades 7-12)	
Chemistry (Grades 6-12)	

Physics 1 (#2003380) 2015 - 2022 (current)

Name	Description
SC.912.E.5.2:	Identify patterns in the organization and distribution of matter in the universe and the forces that determine them.
SC.912.E.5.6:	Develop logical connections through physical principles, including Kepler's and Newton's Laws about the relationships and the effects of Earth, Moon, and Sun on each other.
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
	· · · ·
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.2:	questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.P.8.1:	Differentiate among the four states of matter.
SC.912.P.8.3:	Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes were necessitated by experimental evidence.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.
SC.912.P.10.3:	Compare and contrast work and power qualitatively and quantitatively.
SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter.
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.
SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).
SC.912.P.10.13:	Relate the configuration of static charges to the electric field, electric force, electric potential, and electric potential energy.
SC.912.P.10.14:	Differentiate among conductors, semiconductors, and insulators.
SC.912.P.10.15:	Investigate and explain the relationships among current, voltage, resistance, and power.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.
SC.912.P.10.21:	Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.
SC.912.P.10.22:	Construct ray diagrams and use thin lens and mirror equations to locate the images formed by lenses and mirrors.

 Sci 12 1-32 Analge to motion an agent to hemis at ingoints involves, indicationation the report to a finner of releance) as buccless of time. Sci 12 1-32 Besche how they an inform for the res. Sci 12 1-32 Besche how they an inform for the res. Sci 12 1-32 Besche how they an inform for the res. Sci 12 1-32 Besche how they an inform for the res. Sci 12 1-32 Besche how they an inform for the res. Sci 12 1-32 Besche how they an inform for the res. Sci 12 1-32 Besche how they an inform for the res. Cline soft, fordal relation of the res. C	SC.912.P.12.1:	Distinguish between scalar and vector quantities and assess which should be used to describe an event.
 54.12.11.3. Interschelene gradiental des products have specifications to take means and the distance between dises. 54.22.11.2. Appy the low of conversation of mean mean at a traiter to a means and the distance between dises. 54.22.11.2. Appy the low of conversation of mean mean at a traiter to a means and the distance to a mean of a disease in mean mean at a traiter to a mean of a disease in mean mean at a traiter to a mean of a disease in mean mean at a traiter to a disease in mean mean at a mean of the traiter to a mean of a disease in mean mean at a mean of the mean of means of means	SC.912.P.12.2:	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.
6912 P12.4 Dead to they the grant binding frace between two acquicate deamles on their masks and the diameter binome them. 6912 P12.5 Magnetic frace and complexity in the speed of them in success of them and the diameter binome them. 6912 P12.5 Magnetic frace and integration them in the speed of them in success of them and the diameter binome them. 6912 P12.5 Magnetic frace and integration them in the speed of them in success of the acquired integration them in minicipate and energy in the speed of them in success on the acquired integration them in success of the acquired integration them in the speed of the acquired integration them in success of the acquired integration the success of the acquired integration them in success of them in success of the acquired integration them in them	SC.912.P.12.3:	Interpret and apply Newton's three laws of motion.
 Cal 2 F 12: Applie for an 2 constraintion of hear momentum to interactions such as oblights between distances on matter how they of the light source and working the momentum to interactions such as oblights and sources on matter how they of the light source of a constraintion of the and the mark of momentum to interactions such as oblights and the source of the mark of momentum to interactions such as oblights and the source of the mark of momentum to interactions such as oblights and the source of the mark of momentum to interactions and the source of t	SC.912.P.12.4:	Describe how the gravitational force between two objects depends on their masses and the distance between them.
60 02 8122 exception for information provide provide state from the lippice of provide state of exceptions in the state from the provide state of exceptions in the state from the provide state of exceptions in the state from the provide state of exceptions in the state from the provide state of exceptions in the state of exceptions in the state of exceptions in the state of exception in the state of exceptin in the state of exception in the state of exception in	SC.912.P.12.5:	Apply the law of conservation of linear momentum to interactions, such as collisions between objects.
 Ed. 21.12.9. Records that the singh, and every decend on the fame of reference. Max 112.12.11.1 Che pacht facture diverse to support analysis of sizence and relations at tests a testing to incortain dilation/tools the author makes and to any part of inconsistence in the account. Max 112.12.11.2 Che pacht facture complexity of a less standing to incortain dilation/tools the author makes and to any part of inconsistence in the account. Max 112.12.11.2 Foreign parcely a semplex relation of a less standing to any part of incortain diation of the account. Max 112.12.11.2 Foreign parcely is semplex relation of a less standing to any part of incortain relation of partners. Noting the test standard partners is the account of the accou	SC.912.P.12.7:	Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter now they or the light source are moving.
Ars 112.2857.1.3. Chapter better and webkens to suggest analyses of a series and method less, structuring is improved in a last of y parameters of the author makes and is any gap or monosciences of conclusts of a text summarize compose concepts, processes, or internation presented in a text of y parameters in a text of parameters in a text of y parameter	C.912.P.12.9:	Recognize that time, length, and energy depend on the frame of reference.
Abs.1112.285.1.12 Determine the certral close or canculators of a lark summarize complex concasts, processes, or information presented in a bot by paraphraph the subset in exists accurate the subset of exis	AFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
445.1172.857.1.2. Follow providely complex multility provides and other strying and segmetimes. Liking measurements, ap proferming heathering to structure the society and provides to the structure of the structure o	AFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
At \$ 1112AST 2.4 Determine the meaning of symbols, key ferms, and other domain-specific words and process. AT \$ 112AST 2.6 Analyze mow the load structures information or islass. AT \$ 112AST 2.6 Analyze mow the load structures information or islass. AT \$ 112AST 2.6 Analyze mow the load structures information presented in average of on mean clines. AT \$ 112AST 2.6 Analyze mow the load structures information presented in average of on mean clines. AT \$ 112AST 3.8 Evaluate the hypotheses, data are problem. AT \$ 112AST 3.40 Synthesise information from a range of surces, (a), (a), (asts, seperiments, simulational incorport, and teacher indow them possible and comboarding or distraining a procedure, or one, in groups, and teacher indow them possible. AT \$ 112AST 3.40 Synthesise information from a range of surces, (a), (a), tests, seperiments, simulational incorport, and teacher indow them possible. AT \$ 112AST 3.40 Synthesise information from a range of surces (a), (a), tests, seperiments, simulation or propage, and teacher indow them possible. AT \$ 112AST 3.40 Synthesise information from a range of surces (a), (a), tests, seperiments, simulation or unal tests, and subter indow tests on gradist. AT \$ 112AST 3.40 Synthesise information from a range of surces (a), (a), tests, seperiments, simulation and tests, and subter indow tests on gradist. AT \$ 112AST 3.40 Synthesise information from a range of surces (a), (a), tests, seperiments, simulation	AFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
AF:311281.2.5. Analyze how the test structures information or ideas into categories on plearching. or discussing an experiment in a test, iteration of tests, iteration of the information of tests, iteration of tests, iteratis, iteration of tests,	AFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
ANS 1112 MST 24 Alights the subtrop purpose in providing an explanation describing a procedure, or discussing an experiment in a text, identifying important issues that terminal uncessed. ARS 1112 MST 24 Important dealurate multiple sources of information presented in diverse formats and media log. quantitative data, video, multimedia) in order to advess a quere data with the hypotheses. (data, multiple, issues of formation on terminal information for a source of explanation. ARS 1112 MST 24 Peritorial control of the information of the analysis, and conclusions in a science or terminal information for an entering of sources (e.g., texts, experiments, simulational information dependently and proteins). ARS 1112 MST 24 By the end of parte 12; rests, and sources for formation with possible in the control or analysis of an experiment on the inpole of sources (e.g., texts, appertunce). Internet of parter 12; rests, and sources (e.g., texts, appertunce). ARS 1112 MST 24 By the end of parte 12; rests, and sources information texts in the grades 11-12 text complexity is and independently and proteins. Internet of parter 12; rests, and sources information presented in antibulation interping and responding is question that protein study, explicit yrite with and explanation by referring the oddinal, rests and parter is searce of information presented in diverse formatia and exclanation multiparter information presented in the control of the parter and parter is and texts and texplication orecontext and tex	AFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
Mark 112281.37 Inflatential on wavales multiple sources of information presented in dierse formats and motils (e.g., quantitative data, video, multimedia) in order 17 edireses a quantitative sources of information presented in dierse formats and motils (e.g., quantitative data, video, multimedia) in order 17 edireses a quantitative sources of information. AF3.1112.851.3.7 Evaluate the hypotheses, data, and apply, and conductions in a science or technical text, vertiying the data when possible and combodening or encept, resolving confliction prioring of sources (e.g., texts, spectriments, simulational into a coherent understanding of a process, phenomenon, or encept, resolving confliction prioring of sources (e.g., texts, spectriments, simulational into a coherent understanding of a process, phenomenon, or encept, resolving confliction prioring of callobace (e.g., texts, spectriments, simulational into a coherent understanding of a process, phenomenon, or encept, resolving confliction prioring of callobace (e.g., texts, spectriments, simulational) into a coherent understanding of a process, phenomenon, or encept, resolving confliction prioring of callobace (e.g., texts, spectriments, simulational) into a coherent understanding of a process, phenomenon, or encept, and charmer servers on the topic or itsues in standard callobace encepts. AFS 1112.85.1.1.2 User with peers to promote civil, democratic discussions and decision-making, set clear geats and dead inex, and estabilish individual roles a meeted. Propin Conversition servers and a discust on the state: resolve cantanatolitors when possible and determines what additional information or research is required to despect the inscale discussions and observers of the data. AFS 1112.81.1.2 Norder setting setting setting setrime the resolutin	AFS 1112 DST 2.4.	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues
APS 1112 LSE 1.8 Applications of solution of solution and solution an	AF3.1112.R31.2.0:	that remain unresolved.
APS 1112 IST 3.8 Evolution for hypothesis, data analysis, and conclusions in source of technical lext, with ying the data wing conclusions with analysis and conclusions in source of technical lext in the grades 11-12 text complexy band independently and profilerity. APS 1112 IST 41.00 By the end of grade 11, read and comprehend sciences/technical lexts in the grades 11-12 text complexy band independently and profilerity. APS 1112 IST 41.00 By the end of grade 11, read and comprehend science/technical lexts in the grades 11-12 text complexy band independently and profilerity. APS 1112 IST 41.01 By the end of grade 11, read and comprehend science/technical lexts in the grades 11-12 text complexy band independently and profilerity. APS 1112 IST 41.01 By the end of grade 11, read and comprehend science/technical lexts in the grades 11-12 text complexy band independently and profilerity. APS 1112 IST 41.01 By the end of grade 11, decomplex de	AFS.1112.RST.3.7:	address a question or solve a problem.
APS.1112.R5T.3.9. Synthesize information from a range of sources (e.g., text, septiments, simulations) into a cohort understanding of a process phenomeno, or concept, resolving continuity, and resolve the intervence of continuity, resolving continuity, and resolve the intervence of continuity, resolve continuity, and resolve the intervence of continuity, and resolve continuity, and resolve continuity of continuity, and resolve contradictions, and establish individual roles as a needed. APS.1112.St.1.1: Integrate multiple sources of information prosention is protein dividence metric and alsels of an issue: resolve contradictions, when possible, and determine what udditional information presention is required to decore the investigation or complete the task. APS.1112.St.1.2: Integrate multiple sources of information presention is diverse perspectives; synthesize comments, clains, and evidence metric and sides of an issue: resolve contradictions when possible, and determine what udditional information diverse consolve and resolve contradictions, lange of the context of evidence and relation; assuesing the stance, permise, lange, word vidence, and a resolve contradictions, lange and use of evidence and relation; assuesing the stance, permise, lange, word vidence, and a resolve contradictions, and severation devidence and relation; and se	AFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
AFS.1112.R51.410 By the end of grade 12, read and comprehend selement-shincli texts in the grades 11-12 text complexity build independently and proficiently. Initiate and participate officiency in a range of collaborative discussion (non-on-ne, in grapps, and leach-city) with diverse partners on grades and expressing their own clearly and participate officiency. a. Come to closussions prepared. brieving rand and researched metal auder study: explicitly draw on that preparation by referring to evidences from texts and other research on the lopic or issue to stimulate a thoughful, well-reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue to stimulate a thoughful, well-reasoning and evidence; ensure a hearing for a full range of positions or a topic or issue; carriy, werly, or challenge ideas. AFS.1112.St.1.2 Integrate multiple sources of information presented in diverse formats and media (e.g., visual), quantitatively, orally in order to make informat decisions and social explicit and evidence; and notice and range word choice, and prevent evider to a stark in the grades (Tarrison) and evidence; many discuss and prevents and starts and media (e.g., visual), quantitatively, orally in order to make informat decisions and social prevents in a due of evidence and head on y discepancies among the data. AFS.1112.St.1.2 Integrate multiple sources of information presented in diverse formats and media (e.g., visual), quantitatively, orally in order to make information free sources. AFS.1112.St.1.2 Integrate and targets and subperpring a data cources of enders and theoring. AFS.1112.St.2.4 Respend thought grate grades data (e.g., visual), quantitatively, orally in order to make inf	AFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
Initiate and participate effectively in a range of collaborative discussions one-one-in largoups and teacher-ledy with diverse partners on grades 11-12 topics, tests, and susses, building on otherself discus and expressing their conclusions; and constains prepared. Inhibit researched material under study: explicitly driven in the preparations by referring to evidence from tests and other research on the topic or issue to stimulate a thoughful, well researched material under study: explicitly driven in the preparation by referring to evidence from tests and other research on the topic or issue to stimulate a thoughful, well researched material under study: explicitly driven in the precisions of a topic or issue carry, verify or challenge ideas and conclusions; and promote divergent and real-time and each and evidence: ensure a meeting for a full range of positions or a topic or issue carry, verify or challenge ideas and conclusions; and promote divergent and real issue or stimulate a divergent and widence made on all statics of an issue resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or camplete the task. AFS 1112 SL 1.3: Evaluate a speaker's point of view, reasoning, and use of evidence and rhotor; a substation and subste problemes, explanding the research is required to deepen the investigation or camplete the task. AFS 1112 SL 2.4: Patients of emphasis, and topic parts and meeting and devidence made is divergent and oxing any discregenesis among the data. AFS 1112 SL 2.5: Make strategic use of digital media (e.g., textual; graphical; audio, visual; and interactive elements) in presentations to enhance understanding of thodings, and supporting explice acontext. AFS 1112 SL 2.5:	_AFS.1112.RST.4.10:	By the end of grade 12, read and comprehend science/technical texts in the grades 11-12 text complexity band independently and proficiently.
d. Repond thoughtfuly to diverse perspectives: synthesize comments, claims, and evidence made on all sides of an issue: resolve contradictions when possible: and determine what additional information or research is required to deepen the investigation or complete the task. LAFS.1112.SL.1.2: Integrate multiple sources of information presented in diverse formats and media (e.g., visual), quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. LAFS.1112.SL.2.4: Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used. Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning after analyce or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informatiask. LAFS.1112.SL.2.5: Inforduce, precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop clain(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline appropriate form that anticipates the audience's knowledge level, concerns, values, and possible blases. c. Use words, phrases, and clauses as well as varied syntax to link the major sactions of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and minimitan a formal silyse davide complexity is the appropriate form	LAFS.1112.SL.1.1:	 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue: clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.
AFS.1112.SL.1.3 Evaluate a speaker's point of view, reasoning, and use of evidence and heatonic, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used. AFS.1112.SL.2.4: alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks. AFS.1112.SL.2.5: Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. AFS.1112.SL.2.5: Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. AFS.1112.WHST.1.1: a. Introduce precise, knowledgeebic content. AFS.1112.WHST.1.1: b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledgee level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows	.AFS.1112.SL.1.2:	 d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and poling any discrepancies among the data.
points of emphasis, and tone Used. Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning atternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks. AFS.1112.SL.2.5: Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. Write arguments focused on <i>discipline-specific content</i> . a. a. Introduce precise, knowledgeable clain(5), establish the significance of the claim(5), distinguish the claim(5) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(5) and counterclaims fairly and thorouphy, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(5) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and between reasons and evidence, and between claim(s) and counterclaims. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the discipline in which they are writing. e. Frovide a concluding statement or section that follows from or supports the argument presented. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical proce	LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice,
AFS.1112.SL.2.4: alternative or opposing perspectives and relative or problem in substance and style are appropriate to purpose, audience, and a range of formal and informal tasks. AFS.1112.SL.2.5: Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. Write arguments focused on <i>discipline-specific content</i> . a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) equations of use propriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and counterclaims. d. Establish and mintain a formal style and objective tone while attending to the norse and counterclaims. d. Establish and mintain a formal style and objective tone while attending to the norse and unditised at provide a concluding statement or section that follows from or supports the argument presented. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, con		points of emphasis, and tone used. Present information, findings, and supporting ouidance, convolving a clear and distinct perspective, such that listeners can follow the line of reasoning
AFS.1112.SL.2.5: Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. Write arguments focused on discipline-specific content. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.	AFS.1112.SL.2.4:	alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks
AFS.1112.WHST.1.2: C. Use words, phraseling decide of the complex ideas, concepts, and information of historical events, scientific procedures / experiments, or technical processes. AFS.1112.WHST.1.2: C. Use words, phraseling to complex ideas, and concepts. AFS.1112.WHST.1.2: Provide a concluding statement or section that follows from and supports the topic. AFS.1112.WHST.1.2: Provide a concluding statement or section that follows from and supports the topic. AFS.1112.WHST.1.2: Provide a concluding statement or section that follows from and supports the and topical provide decide. AFS.1112.WHST.1.2: Provide a concluding statement or section that follows from and supports the arguments or supports the arguments or supports the and conventions of the discipline in which they are writing. AFS.1112.WHST.1.2: Provide a concluding statement or section that follows from or supports the arguments presented. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce of concents. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. convert a knowledge able claimes, and concepts. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.	AFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence, and to add interact.
 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic: convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information provided (e.g., articulating implications or the significance of the topic). AFS.1112.WHST.2.4: Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. AFS.1112.WHST.2.5: 	LAFS.1112.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
AFS.1112.WHST.2.4: Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most	_AFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
AFS.1112.WHST.2.5: Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most	AFS 1112 WHST 2 4-	Produce clear and coherent writing in which the development organization, and style are appropriate to task, purpose, and audience
r is well be a set by the set of the set	_AFS.1112.WHST.2.5:	Develop and strengthen writing in which the development, organization, and style are appropriate to task, purpose, and addente. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most

LAFS.1112.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.1112.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.1112.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i>
	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★
	 a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, sub-creat, and piecewice defined functions, including step functions, and sheelute value functions.
MAFS.912.F-IF.3.7:	 Graph square root, cube root, and piecewise-defined functions, including step runctions and absolute value runctions. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.
	 d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.G-MG.1.2:	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star
MAFS.912.N-VM.1.3:	Solve problems involving velocity and other quantities that can be represented by vectors.
	Represent data with plots on the real number line (dot plots, histograms, and box plots). *
MAFS.912.S-ID.1.1:	In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ★
MAFS.912.S-ID.1.2:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). 🖈
MAFS.912.S-ID.1.3:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. \star
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint,
	marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. *
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others
	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from

MAFS.K12.MP.3.1:	which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting Model with mathematics.
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose. Standard Relation to Course: Supporting
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
ELD.K12.ELL.SU.1:	English language learners communicate information, lueas and concepts necessary for academic success in the content area of science.
	o o o o o o o o o o o o o o o o o o o

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners

should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes:

Instructional Practices:

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

Asking questions (for science) and defining problems (for engineering).

- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION	
Course Number: 2003380	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Physical Sciences > Abbreviated Title: PHYS 1
Number of Credits: One (1) credit	Course Length: Year (Y)
Course Type: Core Academic Course	Course Level: 2
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Science (Secondary Grades 7-12)	
Physics (Grades 6-12)	

Physics 1 (#2003380) 2022 - And Beyond

Name	Description
SC.912.E.5.2:	Identify patterns in the organization and distribution of matter in the universe and the forces that determine them.
SC.912.E.5.6:	Develop logical connections through physical principles, including Kepler's and Newton's Laws about the relationships and the effects of Earth, Moon, and Sun on each other.
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
	· · · ·
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.2:	questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.P.8.1:	Differentiate among the four states of matter.
SC.912.P.8.3:	Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes were necessitated by experimental evidence.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.
SC.912.P.10.3:	Compare and contrast work and power qualitatively and quantitatively.
SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter.
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.
SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).
SC.912.P.10.13:	Relate the configuration of static charges to the electric field, electric force, electric potential, and electric potential energy.
SC.912.P.10.14:	Differentiate among conductors, semiconductors, and insulators.
SC.912.P.10.15:	Investigate and explain the relationships among current, voltage, resistance, and power.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.
SC.912.P.10.21:	Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.
SC.912.P.10.22:	Construct ray diagrams and use thin lens and mirror equations to locate the images formed by lenses and mirrors.

SC.912.P.12.1:	Distinguish between scalar and vector quantities and assess which should be used to describe an event.
SC.912.P.12.2:	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.
SC.912.P.12.3:	Interpret and apply Newton's three laws of motion.
SC.912.P.12.4:	Describe how the gravitational force between two objects depends on their masses and the distance between them.
SC.912.P.12.5:	Apply the law of conservation of linear momentum to interactions, such as collisions between objects.
SC.912.P.12.7:	Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving.
SC.912.P.12.9:	Recognize that time, length, and energy depend on the frame of reference.
	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task.
MA.K12.MTR.1.1:	Stay engaged and maintain a positive mindset when working to solve tasks.Help and support each other when attempting a new method or approach.
	Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:
MA.K12.MTR.2.1:	 Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose.
MA.K12.MTR.2.1:	Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:
MA.K12.MTR.3.1:	 Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations.
	 Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
MA.K12.MTR.4.1:	 Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence.
	 Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
	 Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts.

MA.K12.MTR.5.1:	Look for similarities among problems.
	Connect solutions of problems to more complicated large-scale situations.
	Clarifications:
	Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:
	 Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems.
	 Support students to develop generalizations based on the similarities round among problems. Provide opportunities for students to create plans and procedures to solve problems.
	 Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
	Estimate to discover pescible colutions
	 Estimate to discover possible solutions. Use henchmark quantities to determine if a solution makes sense.
	Check calculations when solving problems.
	 Verify possible solutions by explaining the methods used.
MA.K12.MTR.6.1:	Evaluate results based on the given context.
	Clarifications:
	Teachers who encourage students to assess the reasonableness of solutions:
	Have students estimate or predict solutions prior to solving.
	 Prompt students to continually ask, "Does this solution make sense? How do you know?" Deinforce that students check their work as they progress within and after a task.
	 Strengthen students' ability to verify solutions through justifications
	Apply mathematics to real world contexts
	Mathematicians who apply mathematics to real-world contexts:
	Connect mathematical concepts to everyday experiences
	 Use models and methods to understand, represent and solve problems.
	• Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or
	efficiency.
IVIA.KTZ.IVITK.7.1.	Clarifications:
	Teachers who encourage students to apply mathematics to real-world contexts:
	Provide opportunities for students to create models, both concrete and abstract, and perform investigations.
	 Challenge students to question the accuracy of their models and methods. Support students as the uvalidate exploring to accuracy by comparing them to the given situation.
	 Support students as they variate conclusions by comparing them to the given situation. Indicate how variates concepts can be applied to other disciplines.
	CIACIN CALIFORNIA CONTRACTOR C
	K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details
	K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.
	K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In
	K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	 K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly
ELA.K12.EE.1.1:	 K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide
ELA.K12.EE.1.1:	 K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
ELA.K12.EE.1.1:	 K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation.
ELA.K12.EE.1.1:	 K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.1.1:	 K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.1.1: ELA.K12.EE.2.1:	 K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications:
ELA.K12.EE.1.1: ELA.K12.EE.2.1:	 K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.1.1: ELA.K12.EE.2.1:	 K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension.
ELA.K12.EE.1.1: ELA.K12.EE.2.1:	 K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Clarifications: Clarifications:
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1:	 K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1:	 k-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1:	 K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1:	 K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Clarifications: See Text Complexity for grade-level complex texts proficiently. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications:
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1:	 K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide reference do y the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students include grade-level complexity bands and a text complexity rubric. Read and comprehend grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl similing" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully.
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1:	 K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide reference by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Liarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students learn to listen to one another respectfully. In grades 1-2, students learn to listen to enother respectfully.
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1: ELA.K12.EE.4.1:	K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when enga
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1: ELA.K12.EE.4.1:	 K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writting, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students learn to listen to one sather respectfully. In grades 1-2, students learn to listen to one sather respectfully. In grades 1-2, students learn to listen to one sather respectfully. In grades 1-2, students learn to listen to one sather respectfu
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1: ELA.K12.EE.4.1:	k.1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2.3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students bould use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students learn to listen to one another respectfully. In grades 1-2, students buil
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1: ELA.K12.EE.4.1:	K.1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2.3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4.5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complexit bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use ap
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1: ELA.K12.EE.4.1:	K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the gif smiling" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. In kindergarten, students learn to listen to on
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1: ELA.K12.EE.4.1: ELA.K12.EE.5.1:	K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Clarifications: In grades 1-2, students learn to listen to one another respectfully.
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1: ELA.K12.EE.4.1: ELA.K12.EE.5.1:	K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral canomunication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smilling" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of

	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices:

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGl/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Course Number: 2003380

Number of Credits: One (1) credit Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): 9,10,11,12 Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Physical Sciences > Abbreviated Title: PHYS 1 Course Length: Year (Y) Course Level: 2

Educator Certifications

Science (Secondary Grades 7-12) Physics (Grades 6-12)

Physics 1 Honors (#2003390) 2015 - 2022 (current)

Name	Description
SC.912.E.5.2:	Identify patterns in the organization and distribution of matter in the universe and the forces that determine them.
	Develop logical connections through physical principles, including Kepler's and Newton's Laws about the relationships and the effects of Earth, Moon,
SC.912.E.5.6:	and Sun on each other.
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.
00.040 40.40	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate
SC.912.L.18.12:	temperature, expansion upon freezing, and versatility as a solvent.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:
	1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
	5. Plan investigations, (Design and evaluate a scientific investigation).
SC.912.N.1.1:	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	set-up, calibration, technique, maintenance, and storage).
	7. Pose answers, explanations, or descriptions of events,
	8 Generate explanations that explicate or describe natural phenomena (inferences),
	9. Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion
SC 912 N 2 3	Identify examples of pseudoscience (such as astrology, phrenology) in society
00.712.11.2.0.	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and
SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger.
0017121112111	leading to its durability.
	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they
SC.912.N.2.5:	make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as
	they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC 012 N 3 1	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial
56.712.14.5.1.	range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC 912 N 3 3	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those
00.712.14.0.0.	relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported
	descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.P.8.1:	Differentiate among the four states of matter.
SC.912.P.8.3:	Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes
	were necessitated by experimental evidence.
SC.912.P.8.4:	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and lecetions, within the atom.
SC 012 D 10 1	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be it ansionmed from one form to others.
SC.912.P.10.2:	isolated system is a conserved quantity.
SC.912.P.10.3:	Compare and contrast work and power qualitatively and quantitatively.
	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or
SC.912.P.10.4:	states of matter.
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.
SC.912.P.10.6:	Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum
SC.912.P.10.7:	Distinguish between endothermic and exothermic chemical processes.
SC.912.P.10.8	Explain entropy's role in determining the efficiency of processes that convert energy to work

SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).
SC.912.P.10.13:	Relate the configuration of static charges to the electric field, electric force, electric potential, and electric potential energy.
SC.912.P.10.14:	Differentiate among conductors, semiconductors, and insulators.
SC.912.P.10.15:	Investigate and explain the relationships among current, voltage, resistance, and power.
SC.912.P.10.16:	Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and electric fields, and their application to modern technologies.
SC.912.P.10.17:	Explore the theory of electromagnetism by explaining electromagnetic waves in terms of oscillating electric and magnetic fields.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.
SC.912.P.10.21:	Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.
SC.912.P.10.22:	Construct ray diagrams and use thin lens and mirror equations to locate the images formed by lenses and mirrors.
SC.912.P.12.1:	Distinguish between scalar and vector quantities and assess which should be used to describe an event.
SC.912.P.12.2:	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.
SC.912.P.12.3:	Interpret and apply Newton's three laws of motion.
SC.912.P.12.4:	Describe how the gravitational force between two objects depends on their masses and the distance between them.
SC.912.P.12.5:	Apply the law of conservation of linear momentum to interactions, such as collisions between objects.
SC.912.P.12.6:	Qualitatively apply the concept of angular momentum.
SC.912.P.12.7:	Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving.
SC.912.P.12.8:	Recognize that Newton's Laws are a limiting case of Einstein's Special Theory of Relativity at speeds that are much smaller than the speed of light.
SC.912.P.12.9:	Recognize that time, length, and energy depend on the frame of reference.
MAFS.912.A-CED.1.4:	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R. *
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. \star
	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. \star
	a. Graph linear and quadratic functions and show intercepts, maxima, and minima.
MAFS.912.F-IF.3.7:	b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
	c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.
	d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.
	amplitude, and using phase shift.
MAFS.912.G-GMD.1.3:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. \star
MAFS.912.G-GMD.1.3: MAFS.912.G-MG.1.2:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★ Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★
MAFS.912.G-GMD.1.3: MAFS.912.G-MG.1.2: MAFS.912.N-O.1.1:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★ Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★ Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas;
MAFS.912.G-GMD.1.3: MAFS.912.G-MG.1.2: MAFS.912.N-Q.1.1:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★ Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★ Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.G-GMD.1.3: MAFS.912.G-MG.1.2: MAFS.912.N-Q.1.1: MAFS.912.N-Q.1.3:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★ Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★ Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★ Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★
MAFS.912.G-GMD.1.3: MAFS.912.G-MG.1.2: MAFS.912.N-Q.1.1: MAFS.912.N-Q.1.3: MAFS.912.N-VM.1.1:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★ Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★ Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★ Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★ Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate or model for the scale and the origin (area to the scale and the scale to the scale to the scale and the scale and the scale to the scale t
MAFS.912.G-GMD.1.3: MAFS.912.G-MG.1.2: MAFS.912.N-Q.1.1: MAFS.912.N-Q.1.3: MAFS.912.N-VM.1.1:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★ Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★ Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★ Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★ Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, /v/, v , v).
MAFS.912.G-GMD.1.3: MAFS.912.G-MG.1.2: MAFS.912.N-Q.1.1: MAFS.912.N-Q.1.3: MAFS.912.N-VM.1.1: MAFS.912.N-VM.1.2:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★ Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★ Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★ Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★ Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, /v/, v , v). Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. Solve problems involving velocity and other quantities that can be represented by vectors.
MAFS.912.G-GMD.1.3: MAFS.912.G-MG.1.2: MAFS.912.N-Q.1.1: MAFS.912.N-Q.1.3: MAFS.912.N-VM.1.1: MAFS.912.N-VM.1.2: MAFS.912.N-VM.1.3: MAFS.912.N-VM.1.3:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★ Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★ Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★ Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★ Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, /v/, v , v). Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. Solve problems involving velocity and other quantities that can be represented by vectors.
MAFS.912.G-GMD.1.3: MAFS.912.G-MG.1.2: MAFS.912.N-Q.1.1: MAFS.912.N-Q.1.3: MAFS.912.N-VM.1.1: MAFS.912.N-VM.1.2: MAFS.912.N-VM.1.3: MAFS.912.S-IC.2.6:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★ Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★ Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★ Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★ Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, /v/, v , v). Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. Solve problems involving velocity and other quantities that can be represented by vectors. Evaluate reports based on data. ★ Recognize with plots on the real number line (dot plots, bistograms, and box plots). ★
MAFS.912.G-GMD.1.3: MAFS.912.G-MG.1.2: MAFS.912.N-Q.1.1: MAFS.912.N-Q.1.3: MAFS.912.N-VM.1.1: MAFS.912.N-VM.1.2: MAFS.912.N-VM.1.3: MAFS.912.S-IC.2.6:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★ Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★ Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★ Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★ Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, /v/, v , v). Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. Solve problems involving velocity and other quantities that can be represented by vectors. Evaluate reports based on data. ★ Represent data with plots on the real number line (dot plots, histograms, and box plots). ★
MAFS.912.G-GMD.1.3: MAFS.912.G-MG.1.2: MAFS.912.N-Q.1.1: MAFS.912.N-Q.1.3: MAFS.912.N-VM.1.1: MAFS.912.N-VM.1.2: MAFS.912.N-VM.1.3: MAFS.912.S-IC.2.6: MAFS.912.S-ID.1.1:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★ Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★ Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★ Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★ Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, /v/, v , v). Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. Solve problems involving velocity and other quantities that can be represented by vectors. Evaluate reports based on data. ★ Represent data with plots on the real number line (dot plots, histograms, and box plots). ★ Clarifications: In grades 6 - 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.G-GMD.1.3: MAFS.912.G-MG.1.2: MAFS.912.N-Q.1.1: MAFS.912.N-Q.1.3: MAFS.912.N-VM.1.1: MAFS.912.N-VM.1.2: MAFS.912.N-VM.1.3: MAFS.912.S-IC.2.6: MAFS.912.S-ID.1.1:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★ Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★ Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★ Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★ Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, /v/, v , v). Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. Solve problems involving velocity and other quantities that can be represented by vectors. Evaluate reports based on data. ★ Represent data with plots on the real number line (dot plots, histograms, and box plots). ★ Clarifications: In grades 6 - 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ★
MAFS.912.G-GMD.1.3: MAFS.912.G-MG.1.2: MAFS.912.N-Q.1.1: MAFS.912.N-Q.1.3: MAFS.912.N-VM.1.1: MAFS.912.N-VM.1.2: MAFS.912.N-VM.1.3: MAFS.912.S-IC.2.6: MAFS.912.S-ID.1.1:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★ Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★ Use units as a way to understand problems and to guide the solution of multi-step problems: choose and interpret units consistently in formulas: choose and interpret the scale and the origin in graphs and data displays. ★ Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★ Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v. v , v , v). Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. Solve problems involving velocity and other quantities that can be represented by vectors. Evaluate reports based on data. ★ Represent data with plots on the real number line (dot plots, histograms, and box plots). ★ Clarifications: In grades 6 - 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ★ Clarifications:
MAFS.912.G-GMD.1.3: MAFS.912.G-MG.1.2: MAFS.912.N-Q.1.1: MAFS.912.N-Q.1.3: MAFS.912.N-VM.1.1: MAFS.912.N-VM.1.2: MAFS.912.N-VM.1.3: MAFS.912.S-IC.2.6: MAFS.912.S-ID.1.1:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★ Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★ Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★ Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★ Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, /v/, v , v). Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. Solve problems involving velocity and other quantities that can be represented by vectors. Evaluate reports based on data. ★ Represent data with plots on the real number line (dot plots, histograms, and box plots). ★ Clarifications: In grades 6 - 8, students describe center and spread in a data distribution or the existence of extreme data points. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ★ Clarifications: In grades 6 - 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distr
MAFS.912.G-GMD.1.3: MAFS.912.G-MG.1.2: MAFS.912.N-Q.1.1: MAFS.912.N-Q.1.3: MAFS.912.N-VM.1.1: MAFS.912.N-VM.1.2: MAFS.912.N-VM.1.3: MAFS.912.S-IC.2.6: MAFS.912.S-ID.1.1:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★ Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★ Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★ Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★ Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v. /v/, v , v). Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. Solve problems involving velocity and other quantities that can be represented by vectors. Evaluate reports based on data. ★ Represent data with plots on the real number line (dot plots, histograms, and box plots). ★ Clarifications: In grades 6 - 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points. Use statistics appropriate to the shape of the data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution. Here they choose a summary statistic appropriate to the characteristic appropria
MAFS.912.G-GMD.1.3: MAFS.912.G-MG.1.2: MAFS.912.N-Q.1.1: MAFS.912.N-Q.1.3: MAFS.912.N-VM.1.1: MAFS.912.N-VM.1.2: MAFS.912.N-VM.1.3: MAFS.912.S-IC.2.6: MAFS.912.S-ID.1.1:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★ Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★ Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★ Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★ Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, /v/, v , v). Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. Solve problems involving velocity and other quantities that can be represented by vectors. Evaluate reports based on data. ★ Represent data with plots on the real number line (dot plots, histograms, and box plots). ★ Clarifications: In grades 6 - 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points. Use statistics appropriate to the shape of the data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points. Use
MAFS.912.G-GMD.1.3: MAFS.912.G-MG.1.2: MAFS.912.N-Q.1.1: MAFS.912.N-Q.1.3: MAFS.912.N-VM.1.1: MAFS.912.N-VM.1.2: MAFS.912.N-VM.1.3: MAFS.912.S-IC.2.6: MAFS.912.S-ID.1.1: MAFS.912.S-ID.1.2:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★ Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★ Use units as a way to understand problems and to guide the solution of multi-step problems: choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★ Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★ Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, /v/, v , v). Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. Solve problems involving velocity and other quantities that can be represented by vectors. Evaluate reports based on data. ★ Represent data with plots on the real number line (dot plots, histograms, and box plots).★ Clarifications: In grades 6 - 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points. Use statistics appropriate to the shape of the data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points. In grad
MAFS.912.G-GMD.1.3: MAFS.912.G-MG.1.2: MAFS.912.N-Q.1.1: MAFS.912.N-Q.1.3: MAFS.912.N-VM.1.1: MAFS.912.N-VM.1.2: MAFS.912.N-VM.1.3: MAFS.912.S-ID.1.1: MAFS.912.S-ID.1.1: MAFS.912.S-ID.1.2:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★ Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★ Use units as a way to understand problems and to guide the solution of multi-step problems: choose and interpret units consistently in formulas: choose and interpret the scale and the origin in graphs and data displays. ★ Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★ Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, v , v , v). Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. Solve problems involving velocity and other quantities that can be represented by vectors. Evaluate reports based on data. ★ Represent data with plots on the real number line (dot plots, histograms, and box plots). ★ Clarifications: In grades 6 - 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points. Use statistics appropriate to the shape of the data distribution. Here they choose a summary statistic appropriate to the characteristics of the d
MAFS.912.G-GMD.1.3: MAFS.912.G-MG.1.2: MAFS.912.N-Q.1.1: MAFS.912.N-Q.1.3: MAFS.912.N-VM.1.1: MAFS.912.N-VM.1.2: MAFS.912.N-VM.1.3: MAFS.912.S-IC.2.6: MAFS.912.S-ID.1.1: MAFS.912.S-ID.1.2:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★ Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★ Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★ Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★ Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v. [v], v], v). Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. Solve problems involving velocity and other quantities that can be represented by vectors. Evaluate reports based on data. ★ Represent data with plots on the real number line (dot plots, histograms, and box plots). ★ Clarifications: In grades 6 - 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points. Clarifications: In grades 6 - 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points. Clarifications: In grades 6 - 8, students describe center and spread in a data distribution or the existence of extreme data points. Leaders 6 - 8, students describe center and spread in a data distribution or the existence of extreme data points. Leaders 6 - 8, students describe center and spread in a data distribution or the existence of extreme data points. Interpret differences in shape, center, and spread
MAFS.912.G-GMD.1.3: MAFS.912.G-MG.1.2: MAFS.912.N-Q.1.1: MAFS.912.N-Q.1.3: MAFS.912.N-VM.1.1: MAFS.912.N-VM.1.2: MAFS.912.N-VM.1.3: MAFS.912.S-IC.2.6: MAFS.912.S-ID.1.1: MAFS.912.S-ID.1.2: MAFS.912.S-ID.1.3: MAFS.912.S-ID.1.4:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★ Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★ Use units as a way to understand problems and to guide the solution of multi-step problems: choose and interpret units consistently in formulas; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★ Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★ Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, [v/,] v , v). Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. Solve problems involving velocity and other quantities that can be represented by vectors. Evaluate reports based on data. ★ Clarifications: In grades 6 - 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points. Larifications: In grades 6 - 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points. Larifications:
MAFS.912.G-GMD.1.3: MAFS.912.G-MG.1.2: MAFS.912.N-Q.1.1: MAFS.912.N-Q.1.3: MAFS.912.N-VM.1.1: MAFS.912.N-VM.1.2: MAFS.912.N-VM.1.3: MAFS.912.S-IC.2.6: MAFS.912.S-ID.1.1: MAFS.912.S-ID.1.1: MAFS.912.S-ID.1.2: MAFS.912.S-ID.1.3: MAFS.912.S-ID.1.4: MAFS.912.S-ID.2.5:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★ Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★ Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret the scale and the origin in graphs and data displays. ★ Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★ Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, v , v , v). Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. Solve problems involving velocity and other quantities that can be represented by vectors. Evaluate reports based on data. ★ Represent data with plots on the real number line (dot plots, histograms, and box plots). ★ Clarifications: In grades 6 - 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points. In grades 6 - 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points. In grades 6 - 8, students describe center and sp
MAFS.912.G-GMD.1.3: MAFS.912.G-MG.1.2: MAFS.912.N-Q.1.1: MAFS.912.N-Q.1.3: MAFS.912.N-VM.1.1: MAFS.912.N-VM.1.2: MAFS.912.N-VM.1.3: MAFS.912.S-IC.2.6: MAFS.912.S-ID.1.1: MAFS.912.S-ID.1.2: MAFS.912.S-ID.1.2: MAFS.912.S-ID.1.3:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★ Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★ Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★ Choose a level of accuracy appropriate to limitations on measurement when reporting quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, /v/, v , v). Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. Solve problems involving velocity and other quantities that can be represented by vectors. Evaluate reports based on data. ★ Represent data with plots on the real number line (dot plots, histograms, and box plots). ★ Clarifications: In grades 6 - 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points. In grades 6 - 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points. In grades 6 - 8, students describe center and spread in a data distribution
MAFS.912.G-GMD.1.3: MAFS.912.G-MG.1.2: MAFS.912.N-Q.1.1: MAFS.912.N-Q.1.3: MAFS.912.N-VM.1.1: MAFS.912.N-VM.1.2: MAFS.912.N-VM.1.3: MAFS.912.S-ID.1.1: MAFS.912.S-ID.1.1: MAFS.912.S-ID.1.2: MAFS.912.S-ID.1.3: MAFS.912.S-ID.1.4: MAFS.912.S-ID.2.5:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★ Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★ Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas: choose and interpret the scale and the origin in graphs and data displays. ★ Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★ Recognize vector quantities as having both magnitudes and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v. /v/, v v). Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. Solve problems involving velocity and other quantities that can be represented by vectors. Evaluate reports based on data. ★ Represent data with plots on the real number line (dot plots, histograms, and box plots). ★ Clarifications: In grades 6 - 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points. In grades 6 - 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.G-GMD.1.3: MAFS.912.G-MG.1.2: MAFS.912.N-Q.1.1: MAFS.912.N-Q.1.3: MAFS.912.N-VM.1.1: MAFS.912.N-VM.1.2: MAFS.912.N-VM.1.3: MAFS.912.S-ID.1.1: MAFS.912.S-ID.1.1: MAFS.912.S-ID.1.2: MAFS.912.S-ID.1.3: MAFS.912.S-ID.1.4: MAFS.912.S-ID.2.5:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★ Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot), ★ Use units as a way to understand problems and to guide the solution of multi-step problems: choose and interpret units consistently in formulas: choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★ Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v. v , v , v). Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. Solve problems involving velocity and other quantities that can be represented by vectors. Evaluate reports based on data. ★ Represent data with plots on the real number line (dot plots, histograms, and box plots). ★ Clarifications: In grades 6 - 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the data distribution or the existence of extreme data points. In grades 6 - 8, students describe center and spread in a data distribution or the existence of extreme data points. In grades 6 - 8, students describe center and spread in a data distribution or the existence of extreme data points. In grades 6 - 8, students describe center and spread in a data distribution or the exis
MAFS.912.G-GMD.1.3: MAFS.912.G-MG.1.2: MAFS.912.N-Q.1.1: MAFS.912.N-Q.1.3: MAFS.912.N-VM.1.1: MAFS.912.N-VM.1.2: MAFS.912.N-VM.1.3: MAFS.912.S-ID.1.1: MAFS.912.S-ID.1.1: MAFS.912.S-ID.1.2: MAFS.912.S-ID.1.3: MAFS.912.S-ID.1.4: MAFS.912.S-ID.2.5:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★ Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★ Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★ Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★ Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v. / v/, v , v). Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. Solve problems involving velocity and other quantities that can be represented by vectors. Evaluate reports based on data. ★ Represent data with plots on the real number line (dot plots, histograms, and box plots). ★ Clarifications: In grades 6 - 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the chara distribution, such as the shape of the distribution or the existence of extreme data points. Use statistics appropriate to the shape of the distribution. Here they choose a summary statistic appropriate to the chara distribution, such as the shape of the distribution or the existence of extreme data points. Interpret differences in shape, center, and spread in
MAFS.912.G-GMD.1.3: MAFS.912.G-MG.1.2: MAFS.912.N-Q.1.1: MAFS.912.N-Q.1.3: MAFS.912.N-VM.1.1: MAFS.912.N-VM.1.2: MAFS.912.N-VM.1.3: MAFS.912.S-ID.1.1: MAFS.912.S-ID.1.1: MAFS.912.S-ID.1.2: MAFS.912.S-ID.1.3: MAFS.912.S-ID.1.4: MAFS.912.S-ID.2.5:	 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★ Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★ Use units as a way to understand problems and to guide the solution of multi-step problems: choose and interpret units consistently in formulas: choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★ Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v. [v/], [v]). Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. Solve problems involving velocity and other quantities that can be represented by vectors. Evaluate reports based on data. ★ Represent data with plots on the real number line (dot plots, histograms, and box plots). ★ Clarifications: In grades 6 - 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points. Use statistics appropriate to the shape of the data distribution or the existence of extreme data points. Interpret differences in shape, center, and spread in a data distribution or the existence of extreme data points. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points. In grades 6 - 8, students describe center and spread in a data distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use a distribution or the existence of extreme data points. Interpret diffe

	Clarifications: Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting
MAFS.K12.MP.2.1:	Reason abstractly and quantitatively. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
MAFS.K12.MP.3.1:	Mathematically proficient students and childre the reasoning of others. Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting
MAFS.K12.MP.4.1:	Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting
MAFS.K12.MP.5.1:	Use appropriate tools strategically. Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting Look for and make use of structure.
	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later,

MAFS.K12.MP.7.1:	students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression x^2 + 9x + 14, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
MAFS.K12.MP.8.1:	Look for and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LAFS.1112.RST.4.10:	By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.
LAFS.1112.SL.1.1:	 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.1112.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic;

	convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.1112.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.1112.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.1112.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

While the content focus of this course is consistent with the Physics I course, students will explore these concepts in greater depth. In general, the academic pace and rigor will be greatly increased for honors level course work. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school level a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2003390	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number . 2003370	Education Courses > Subject: Science > SubSubject:
	Physical Sciences >
	Abbreviated Title: PHYS 1 HON
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Science (Secondary Grades 7-12)	
Physics (Grades 6-12)	

Physics 1 Honors (#2003390) 2022 - And Beyond

Name	Description
SC.912.E.5.2:	Identify patterns in the organization and distribution of matter in the universe and the forces that determine them.
SC 012 E 5 6	Develop logical connections through physical principles, including Kepler's and Newton's Laws about the relationships and the effects of Earth, Moon,
30.712.E.3.0.	and Sun on each other.
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate
	temperature, expansion upon freezing, and versatility as a solvent.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:
	1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	2. Eversing backs and other sources of information to see what is closed known.
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and it not, modily or develop new models).
SC 912 N 1 1	5. Plan investigations, (Design and evaluate a scientific investigation).
001712111111	o. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphis), (Collect data of evidence in an
	organized way. Propenty use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	7 Pose answers, explanations, or descriptions of events
	 Constants explanations, or descriptions or events, Constants explanations that explicate or describe natural phenomena (inforences).
	 Generate explanations that explicate or describe natural phenomena (interferces), Use appropriate evidence and reasoning to justify these explanations to others.
	9. Ose appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	The Evaluate the ments of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as
CO 010 N 0 0	questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.
SC 012 N 2 4	explain that scientific knowledge is both durable and robust and open to change, scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger
36.712.11.2.4.	leading to its durability.
	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they
SC.912.N.2.5:	make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as
	they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC 012 N 2 1.	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial
36.712.11.3.1.	range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those
	relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC 912 N 3 5	Describe the function of models in science, and identify the wide range of models used in science.
SC 912 N 4 1	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making
SC 912 P 8 1	Differentiate among the four states of matter
0017121110111	Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes
SC.912.P.8.3:	were necessitated by experimental evidence.
CC 010 D 0 4	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons,
30.912.P.8.4:	and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an
	isolated system is a conserved quantity.
SC.912.P.10.3:	Compare and contrast work and power qualitatively and quantitatively.
SC.912.P.10.4:	Describe neat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or
SC 012 D 10 5	States of matters.
SC 012 P 10 6	relate temperature to the average molecular kinetic energy.
SC 012 P 10 7	Distinguish between endothermic and evolvermic chemical processes
SC 912 P 10 8	Explain entropy's role in determining the efficiency of processes that convert energy to work
30.712.1.10.0.	Explainent opy show in determining the enciency of processes that convert energy to work.

SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).
SC.912.P.10.13:	Relate the configuration of static charges to the electric field, electric force, electric potential, and electric potential energy.
SC.912.P.10.14;	Differentiate among conductors, semiconductors, and insulators.
SC.912.P.10.15;	Investigate and explain the relationships among current, voltage, resistance, and power.
	Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and electric fields, and their application to
SC.912.P.10.16:	modern technologies.
SC.912.P.10.17:	Explore the theory of electromagnetism by explaining electromagnetic waves in terms of oscillating electric and magnetic fields.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.
SC.912.P.10.21:	Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.
SC.912.P.10.22:	Construct ray diagrams and use thin lens and mirror equations to locate the images formed by lenses and mirrors.
SC.912.P.12.1:	Distinguish between scalar and vector quantities and assess which should be used to describe an event.
SC.912.P.12.2:	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.
SC.912.P.12.3:	Interpret and apply Newton's three laws of motion.
SC.912.P.12.4:	Describe how the gravitational force between two objects depends on their masses and the distance between them.
SC.912.P.12.5:	Apply the law of conservation of linear momentum to interactions, such as collisions between objects.
SC.912.P.12.6:	Qualitatively apply the concept of angular momentum.
SC.912.P.12.7:	Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving.
SC.912.P.12.8:	Recognize that Newton's Laws are a limiting case of Einstein's Special Theory of Relativity at speeds that are much smaller than the speed of light.
SC.912.P.12.9:	Recognize that time, length, and energy depend on the frame of reference.
	Mathematicians who participate in effortful learning both individually and with others:
	Analyze the problem in a way that makes sense given the task.
	Ask questions that will help with solving the task.
	Build perseverance by modifying methods as needed while solving a challenging task.
	Stay engaged and maintain a positive mindset when working to solve tasks.
	Help and support each other when attempting a new method or approach.
MA.K12.MTR.1.1:	Clarifications:
	Teachers who encourage students to participate actively in effortful learning both individually and with others:
	Cultivate a community of growth mindset learners.
	Foster perseverance in students by choosing tasks that are challenging.
	Develop students' ability to analyze and problem solve.
	Recognize students' effort when solving challenging problems.
	Demonstrate understanding hu representing problems in multiple ways
	Mathematicians who demonstrate understanding by representing problems in multiple ways:
	 Build understanding through modeling and using manipulatives.
	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
	 Progress from modeling problems with objects and drawings to using algorithms and equations.
	 Express connections between concepts and representations.
MA.K12.MTR.2.1:	Choose a representation based on the given context or purpose.
	Clarifications:
	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:
	Help students make connections between concepts and representations.
	Provide opportunities for students to use manipulatives when investigating concepts.
	Guide students from concrete to pictorial to abstract representations as understanding progresses.
	• Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency
	Mathematicians who complete tasks with mathematical fluency:
	Select efficient and appropriate methods for solving problems within the given context.
	 Maintain flexibility and accuracy while performing procedures and mental calculations.
	Complete tasks accurately and with confidence.
MA.K12.MTR.3.1:	Adapt procedures to apply them to a new context.
IVIA.K 12.IVI1K.3.1:	Use feedback to improve efficiency when performing calculations.
	Clarifications:
	Teachers who encourage students to complete tasks with mathematical fluency:
	Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
	Offer multiple opportunities for students to practice efficient and generalizable methods.
	Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others.
	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others.
	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to these expressed by others.
	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Description and express how to engreptive the table.

MA.K12.MTR.4.1:	 Justify results by explaining methods and processes. Construct possible arguments based on evidence.
	 Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
MA.K12.MTR.5.1:	 Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations.
	 Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA K12 MTD 6 1-	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context
MA.K12.MTR.6.1:	 Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or officiency.
MA.K12.MTR.7.1:	Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the

	girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

While the content focus of this course is consistent with the Physics I course, students will explore these concepts in greater depth. In general, the academic pace and rigor will be greatly increased for honors level course work. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills.

To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html? Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION	
Course Number: 2003390	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Physical Sciences >
Number of Credits: One (1) credit	Abbreviated Title: PHYS 1 HON Course Length: Year (Y) Course Attributes: • Honors
Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): 9 10 11 12	Course Level: 3
Graduation Requirement: Equally Rigorous S	icience

Science (Secondary Grades 7-12)
Physics (Grades 6-12)

Physics 2 Honors (#2003410) 2015 - 2022 (current)

Name	Description
SC.912.E.5.7:	Relate the history of and explain the justification for future space exploration and continuing technology development.
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.
SC.912.E.5.9:	Analyze the broad effects of space exploration on the economy and culture of Florida.
SC.912.E.5.10:	Describe and apply the coordinate system used to locate objects in the sky.
SC.912.E.5.11:	Distinguish the various methods of measuring astronomical distances and apply each in appropriate situations.
SC.912.E.6.6:	Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies.
SC.912.E.7.7:	Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.
SC.912.L.15.2:	Discuss the use of molecular clocks to estimate how long ago various groups of organisms diverged evolutionarily from one another.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
SC.912.N.1.1:	 Pose question during backet budy on knowledgy, for examples, biology, functionally, protect, and do the interpreter block of the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
	11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
00 040 N 0 0	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as
SC.912.N.2.2:	questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions
SC 912 N 3 5	Describe the function of models in science, and identify the wide range of models used in science.
SC 912 N 4 1	Evolution and remember of models in such to, and reseming the wide range of models discum subfille.
50.712.IN.T.T.	Explainment solution to wroade and reasoning provide an empirically based perspective to inform soliety succision making.

SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter
SC.912.P.10.6:	Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum.
SC.912.P.10.8:	Explain entropy's role in determining the efficiency of processes that convert energy to work.
SC.912.P.10.9:	Describe the quantization of energy at the atomic level.
SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).
SC.912.P.10.11:	Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues.
SC.912.P.10.12:	Differentiate between chemical and nuclear reactions.
SC.912.P.10.16:	Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and electric fields, and their application to modern technologies.
SC.912.P.10.17:	Explore the theory of electromagnetism by explaining electromagnetic waves in terms of oscillating electric and magnetic fields.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.10.19:	Explain that all objects emit and absorb electromagnetic radiation and distinguish between objects that are blackbody radiators and those that are not.
SC.912.P.10.21:	Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.
SC.912.P.12.5:	Apply the law of conservation of linear momentum to interactions, such as collisions between objects.
SC.912.P.12.6:	Qualitatively apply the concept of angular momentum.
SC.912.P.12.8:	Recognize that Newton's Laws are a limiting case of Einstein's Special Theory of Relativity at speeds that are much smaller than the speed of light.
SC.912.P.12.9:	Recognize that time, length, and energy depend on the frame of reference.
SC.912.P.12.10:	Interpret the behavior of ideal gases in terms of kinetic molecular theory.
LAFS.1112.RST.1.1:	or inconsistencies in the account.
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LAFS.1112.RST.4.10:	By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.
	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
LAFS.1112.SL.1.1:	 a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.1: LAFS.1112.SL.1.2:	 a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.1: LAFS.1112.SL.1.2: LAFS.1112.SL.1.3:	 a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.1.1: LAFS.1112.SL.1.2: LAFS.1112.SL.1.3: LAFS.1112.SL.2.4:	 a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used. Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.SL.1.1: LAFS.1112.SL.1.2: LAFS.1112.SL.1.3: LAFS.1112.SL.2.4: LAFS.1112.SL.2.5:	 a. Come to discussions prepared, having read and researched material under study: explicitly drawn of that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used. Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.1112.SL.1.1: LAFS.1112.SL.1.2: LAFS.1112.SL.1.3: LAFS.1112.SL.2.4: LAFS.1112.SL.2.5:	 a. Come to discussions prepared, having read and researched material under study, explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence: ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions: and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives: synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used. Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. Write arg

LAFS.1112.WHST.1.2:	 a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.1112.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.1112.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.1112.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i>
MAFS.912.F-IF.3.7:	 cases. ★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.G-MG.1.2:	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. \star
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. *
MAFS.912.N-VM.1.1:	symbols for vectors and their magnitudes (e.g., v , $ v $, $ v $, v).
MAFS.912.N-VIVI.1.2:	Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.
MAFS.912.S-IC.2.6:	Evaluate reports based on data. *
	Represent data with plots on the real number line (dot plots, histograms, and box plots). ★
MAFS.912.S-ID.1.1:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. \star
MAFS.912.S-ID.1.2:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.3:	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. \star
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. ★
MAFS.912.S-ID.2.6:	 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association.
	Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting

	a line to data, students assess how well the model fits by analyzing residuals.
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting Reason abstractly and quantitatively
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting
MAFS.K12.MP.4.1:	Nodel with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see

	complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $\frac{2}{3}$ where $\frac{1}{3}$ and $\frac{1}{3}$
	S(x - y) ² as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary
	students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a
	repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3,
MAFS.K12.MP.8.1:	middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$.
	$(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a
	problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the
	reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
FLD K12 FLL SL1	English language learners communicate for social and instructional purposes within the school setting

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- · Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Number of Credits: One (1) credit

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Physical Sciences > Abbreviated Title: PHYS 2 HON Course Length: Year (Y) Course Attributes: • Honors Course Level: 3

Science (Secondary Grades 7-12)
Physics (Grades 6-12)

Physics 2 Honors (#2003410) 2022 - And Beyond

Name	Description
SC.912.E.5.7:	Relate the history of and explain the justification for future space exploration and continuing technology development.
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.
SC.912.E.5.9:	Analyze the broad effects of space exploration on the economy and culture of Florida.
SC.912.E.5.10:	Describe and apply the coordinate system used to locate objects in the sky.
SC.912.E.5.11:	Distinguish the various methods of measuring astronomical distances and apply each in appropriate situations.
SC.912.E.6.6:	Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies.
SC.912.E.7.7:	Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.
SC.912.L.15.2:	Discuss the use of molecular clocks to estimate how long ago various groups of organisms diverged evolutionarily from one another.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations of describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger,
	leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.N.3.5	Describe the function of models in science, and identify the wide range of models used in science
SC.912.N.4.1:	
	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making

SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter.
SC.912.P.10.6:	Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum.
SC.912.P.10.8:	Explain entropy's role in determining the efficiency of processes that convert energy to work.
SC.912.P.10.9:	Describe the quantization of energy at the atomic level.
SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).
SC.912.P.10.11:	issues.
SC.912.P.10.12:	Differentiate between chemical and nuclear reactions.
SC.912.P.10.16:	Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and electric fields, and their application to modern technologies
SC.912.P.10.17:	Explore the theory of electromagnetism by explaining electromagnetic waves in terms of oscillating electric and magnetic fields.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.10.19:	Explain that all objects emit and absorb electromagnetic radiation and distinguish between objects that are blackbody radiators and those that are not.
SC.912.P.10.21:	Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.
SC.912.P.12.5:	Apply the law of conservation of linear momentum to interactions, such as collisions between objects.
SC.912.P.12.6:	Qualitatively apply the concept of angular momentum.
SC.912.P.12.8:	Recognize that Newton's Laws are a limiting case of Einstein's Special Theory of Relativity at speeds that are much smaller than the speed of light.
SC.912.P.12.9:	Recognize that time, length, and energy depend on the frame of reference.
SC.912.P.12.10:	Interpret the behavior of ideal gases in terms of kinetic molecular theory.
	Mathematicians who participate in effortful learning both individually and with others:
	 Analyze the problem in a way that makes sense given the task. Ask sweetings that will halp with asking the task.
	 Ask questions that will help with solving the task. Build persoverance by medifying methods as peeded while solving a challenging task.
	Stay engaged and maintain a positive mindset when working to solve tasks
	 Help and support each other when attempting a new method or approach.
MA.K12.MTR.1.1:	
	Teachers who encourage students to participate actively in effortful learning both individually and with others:
	Cultivate a community of growth mindset learners.
	Foster perseverance in students by choosing tasks that are challenging.
	Develop students' ability to analyze and problem solve.
	Recognize students' effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:
	Mathematicians who demonstrate and standing by representing problems in matiple ways.
	Build understanding through modeling and using manipulatives.
	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Dragress from modeling problems with objects and drawings to using algorithms and equations.
	 Progress nom modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations.
MA K12 MTR 2 1 [.]	Choose a representation based on the given context or purpose.
	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:
	Help students make connections between concepts and representations.
	Provide opportunities for students to use manipulatives when investigating concepts.
	Guide students from concrete to pictorial to abstract representations as understanding progresses.
	Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency.
	Mathematicians who complete tasks with mathematical nuency:
MA.K12.MTR.3.1:	Select efficient and appropriate methods for solving problems within the given context.
	Maintain flexibility and accuracy while performing procedures and mental calculations.
	Complete tasks accurately and with confidence. Adapt procedures to apply them to a pew context.
	Adapt proceedies to apply them to a new context. Ise feedback to improve efficiency when performing calculations
	Teachers who encourage students to complete tasks with mathematical fluency:
	Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
	Offer multiple opportunities for students to practice efficient and generalizable methods.
	• Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
	Communicate methodes used bullary and methods offsatively
	Communicate mathematical libring of others Analyze the mathematical thinking of others
	Compare the efficiency of a method to those expressed by others
	Recognize errors and suggest how to correctly solve the task.
	 Justify results by explaining methods and processes.
MA.K12.MTR.4.1:	Construct possible arguments based on evidence.

	Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
MA.K12.MTR.5.1:	 Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations.
	 Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
	Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
MA.K12.MTR.7.1:	Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.N 12.EE. I. I.	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	9-12 Students continue with previous skills and use a style guide to create a proper citation.9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.

ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.	
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.	
	Use appropriate voice and tone when speaking or writing.	
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.	
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.	
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.	

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p.77; NSTA, 2007).

Special Notes

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2003410

Number of Credits: One (1) credit

Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Educator Certifications

Science (Secondary Grades 7-12) Physics (Grades 6-12)

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult

Education Courses > Subject: Science > SubSubject:

Physical Sciences >

Course Level: 3

Course Length: Year (Y) Course Attributes: • Honors

Abbreviated Title: PHYS 2 HON

Advanced Placement Physics 1 (#2003421) 2014 - And Beyond (current)

General Course Information and Notes

VERSION DESCRIPTION

The course description for this Advanced Placement courses is located on the College Board site at http://apcentral.collegeboard.com/apc/public/courses/teachers_corner/index.html.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2003/21	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2003421	Education Courses > Subject: Science > SubSubject:
	Physical Sciences >
	Abbreviated Title: AP PHYSICS 1
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Advanced Placement (AP)
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Science (Secondary Grades 7-12)	
Physics (Grades 6-12)	
Advanced Placement Physics 2 (#2003422) 2014 - And Beyond (current)

General Course Information and Notes

VERSION DESCRIPTION

The course description for this Advanced Placement courses is located on the College Board site at http://apcentral.collegeboard.com/apc/public/courses/teachers_corner/index.html.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2003422	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number. 2003422	Education Courses > Subject: Science > SubSubject:
	Physical Sciences >
	Abbreviated Title: AP PHYSICS 2
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Advanced Placement (AP)
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Educator Certifications

cience (Secondary Grades 7-12)	
Physics (Grades 6-12)	

Advanced Placement Physics C: Electricity and Magnetism (#2003425) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The course description for this Advanced Placement courses is located on the College Board site at http://apcentral.collegeboard.com/apc/public/courses/teachers_corner/index.html.

GENERAL INFORMATION

Course Number: 2003425

Number of Credits: One (1) credit

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Physical Sciences > Abbreviated Title: AP PHYSICS: E&M Course Length: Year (Y) Course Attributes: • Advanced Placement (AP) Course Level: 3

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Educator Certifications

Science (Secondary Grades 7-12)	
Physics (Grades 6-12)	

Equivalent Courses

2003431-Cambridge AICE Physics 1 AS Level

Advanced Placement Physics C: Mechanics (#2003430) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The course description for this Advanced Placement courses is located on the College Board site at http://apcentral.collegeboard.com/apc/public/courses/teachers_corner/index.html.

GENERAL INFORMATION

Course Number: 2003430

Number of Credits: One (1) credit

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Physical Sciences > Abbreviated Title: AP PHYSICS C: ME Course Length: Year (Y) Course Attributes: • Advanced Placement (AP) Course Level: 3

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Educator Certifications

Science (Secondary Grades 7-12)	
Physics (Grades 6-12)	

Equivalent Courses

2003431-Cambridge AICE Physics 1 AS Level

Cambridge AICE Physics 1 AS Level (#2003431) 2014- And

Beyond (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-advanced/cambridge-international-as-and-a-levels/curriculum/.

GENERAL INFORMATION	
Course Number: 2003431	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Physical Sciences >
Number of Credits: One (1) credit	Abbreviated Title: AICE PHYSICS 1 AS Course Length: Year (Y) Course Attributes: • Advanced International Certificate of Education
Course Type: Core Academic Course Course Status: Course Approved	(AICE) Course Level: 3
Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Scie	nce

Educator Certifications

Science (Secondary Grades 7-12)	
Physics (Grades 6-12)	

Equivalent Courses

2003430-Advanced Placement Physics C: Mechanics 2003425-Advanced Placement Physics C: Electricity, Magnetism

Cambridge Pre-AICE Physics IGCSE Level (#2003432) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-secondary-2/cambridge-igcse/curriculum/.

	Course Path: Section: Grades Prek to 12 Education
Course Number: 2003432	Courses > Grade Group: Grades 9 to 12 and Adult
	Education Courses > Subject: Science > SubSubject:
	Physical Sciences >
	Abbreviated Title: PRE-AICE PHYSICS IG
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Advanced International Certificate of Education
	(AICE)
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Scien	ce

Educator Certifications

Science (Secondary Grades 7-12)	
Physics (Grades 6-12)	

Cambridge AICE Physics 2 A Level (#2003433) 2014 - And Beyond

(current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-advanced/cambridge-international-as-and-a-levels/curriculum/.

GENERAL INFORMATION	
Course Number: 2003433	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Physical Sciences > Abbreviated Title: AICE PHYSICS 2 AL
Number of Credits: One (1) credit	Course Length: Year (Y) Course Attributes: • Advanced International Certificate of Education (AICE)
Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science	Course Level: 3

Educator Certifications

Physics (Grades 6-12)	
Science (Secondary Grades 7-12)	

Renewable Energy 1 Honors (#2003500) 2015 - 2022 (current)

Name	Description
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.
SC.912.E.5.9:	Analyze the broad effects of space exploration on the economy and culture of Florida.
SC.912.E.6.4:	Analyze how specific geologic processes and features are expressed in Florida and elsewhere.
SC.912.E.6.6:	Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies.
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
SC.912.E.7.2:	Analyze the causes of the various kinds of surface and deep water motion within the oceans and their impacts on the transfer of energy between the poles and the equator.
SC.912.E.7.3:	Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.
SC.912.E.7.4:	Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans.
SC.912.E.7.7:	Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.
SC.912.E.7.8:	Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually and collectively.
SC.912.E.7.9:	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.12:	Discuss the political, social, and environmental consequences of sustainable use of land.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.14:	Assess the need for adequate waste management strategies.
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
SC.912.L.17.17:	Assess the effectiveness of innovative methods of protecting the environment.
SC.912.L.17.18:	Describe how human population size and resource use relate to environmental quality.
SC.912.L.17.19:	Describe how different natural resources are produced and how their rates of use and renewal limit availability.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.

SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.2:	Explore the Law or Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.
SC.912.P.10.11:	explain and compare nuclear reactions (radioactive decay, insign and rusion), the energy changes associated with them and their associated safety issues.
SC.912.P.10.14:	Differentiate among conductors, semiconductors, and insulators.
SC.912.P.10.15:	Investigate and explain the relationships among current, voltage, resistance, and power.
SC.912.P.10.16:	Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and electric fields, and their application to modern technologies.
SC.912.P.10.17:	Explore the theory of electromagnetism by explaining electromagnetic waves in terms of oscillating electric and magnetic fields.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LAFS.1112.RS1.4.10:	 By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proticiently. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.1112.WHST.1.1:	 write arguments tocused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

LAFS.1112.WHST.1.2:	 a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.1112.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.1112.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.1112.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
MAFS.912.S-IC.2.6:	Evaluate reports based on data. ★
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting
	Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects. Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others.
MAFS.K12.MP.2.1: MAFS.K12.MP.3.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved: attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects. Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others. Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments ow which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and
MAFS.K12.MP.2.1: MAFS.K12.MP.3.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects. Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others. Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that is into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and a
MAFS.K12.MP.2.1: MAFS.K12.MP.3.1: MAFS.K12.MP.4.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and mainpulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize—to abstract a given situation and represent it symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand: considering the units involved: attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects. Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others. Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justible arguments is and ters, they consoning if rom that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents and others, decide whether they make sense, and earnered, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others; decide whether they make sense, and as useful questions to clarify or improve the arguments. Standard Relation to Course: Supporting Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the wor
MAFS.K12.MP.2.1: MAFS.K12.MP.3.1: MAFS.K12.MP.4.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and mainpluate the representing symbols as if they have alle of their own, without necessarily attending to their referents—and the ability to constructualize, to pause as needed during the mainpluation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand: considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects. Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others. Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical programs and sequence that be into account the others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the others (so and zero explicit) by torking them into cases, and can recognize as also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reason inductively about data, making plausible arguments and and suce sense and be correct, even though they are not generalized or made formal until later grades. Later, students laten to determine domains to which an argument—explain what it is. Elementary students can construct arguments at all grades can listen or read the arguments of others, decide whether they make sense, and ak useful questions to clarify or improve the arguments. Standard Relation to Course: Supporting Mathematically proficient students can apply the math

н

MAFS.K12.MP.5.1:	concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Standard Relation to Course: Supporting
MAFS.K12.MP.8.1:	Look for and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results. Standard Relation to Course: Supporting
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
HE.912.C.1.3:	Evaluate how environment and personal health are interrelated. Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
	Analyze the impact of citizen participation as a means of achieving political and social change.
SS.912.C.2.8:	Clarifications: Examples are e-mail campaigns, boycotts, blogs, podcasts, protests, demonstrations, letters to editors.

General Course Information and Notes

VERSION DESCRIPTION

The course content includes: an introduction to energy technology, renewable energy in a sustainable future, the science behind climate change, environmental impacts and economics, and careers in renewable energy. Students will be introduced to different types of renewable energy technologies, how they work, their advantages, disadvantages, and limitations. The types of renewable energies and technologies studied include: wind energy, solar (thermal and photovoltaic), hydro-electric, bio-energy, tidal power, wave energy, geothermal energy, ocean thermal, fuel cells, heat pump systems, and high voltage DC energy transport. The availability and integration of these energy types and technologies are also studied to understand how renewable energy can work as a compliment to and replacement for conventional technologies.

GENERAL NOTES

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2003500

Number of Credits: One (1) credit

Course Type: Elective Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Physical Sciences > Abbreviated Title: RENEWABLE ENERGY 1 H Course Length: Year (Y) Course Attributes: • Honors Course Level: 3

Educator Certifications

Chemistry (Grades 6-12) Physics (Grades 6-12)

Renewable Energy 1 Honors (#2003500) 2022-2023

Name	Description
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.
SC.912.E.5.9:	Analyze the broad effects of space exploration on the economy and culture of Florida.
SC.912.E.6.4:	Analyze how specific geologic processes and features are expressed in Florida and elsewhere.
SC.912.E.6.6:	Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies.
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
SC.912.E.7.2:	Analyze the causes of the various kinds of surface and deep water motion within the oceans and their impacts on the transfer of energy between the poles and the equator.
SC.912.E.7.3:	Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.
SC.912.E.7.4:	Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans.
SC.912.E.7.7:	Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.
SC.912.E.7.8:	Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually and collectively.
SC.912.E.7.9:	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.12:	Discuss the political, social, and environmental consequences of sustainable use of land.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.14:	Assess the need for adequate waste management strategies.
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
SC.912.L.17.17:	Assess the effectiveness of innovative methods of protecting the environment.
SC.912.L.17.18:	Describe how human population size and resource use relate to environmental quality.
SC.912.L.17.19:	Describe how different natural resources are produced and how their rates of use and renewal limit availability.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
SC.912.N.1.1:	 Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.

SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus a scientific theory represents the most powerful explanation scientists have to offer
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	human, economic, and environmental.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.
SC.912.P.10.11:	Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues.
SC.912.P.10.14:	Differentiate among conductors, semiconductors, and insulators.
SC.912.P.10.15:	Investigate and explain the relationships among current, voltage, resistance, and power.
SC.912.P.10.16:	modern technologies.
SC.912.P.10.17:	Explore the theory of electromagnetism by explaining electromagnetic waves in terms of oscillating electric and magnetic fields.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
	Mathematicians who participate in effortful learning both individually and with others:
	 Analyze the problem in a way that makes sense given the task. Ask questions that will belo with solving the task
	 Build perseverance by modifying methods as needed while solving a challenging task.
	Stay engaged and maintain a positive mindset when working to solve tasks.
MΔ K12 MTR 1 1·	Help and support each other when attempting a new method or approach.
WIA.(C12.)WITK.1.1.	Clarifications:
	Cultivate a community of growth mindset learners.
	 Foster perseverance in students by choosing tasks that are challenging.
	Develop students' ability to analyze and problem solve.
	Recognize students' effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:
	Build understanding through modeling and using manipulatives.
	Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
	Progress from modeling problems with objects and drawings to using algorithms and equations.
	Express connections between concepts and representations.
IVIA.K12.IVI1R.2.1:	Choose a representation based on the given context or purpose.
	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:
	Help students make connections between concepts and representations.
	Provide opportunities for students to use manipulatives when investigating concepts.
	Guide students from concrete to pictorial to abstract representations as understanding progresses.
	Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:
	Select efficient and appropriate methods for solving problems within the given context.
	Maintain flexibility and accuracy while performing procedures and mental calculations.
	Complete tasks accurately and with confidence.
MA.K12.MTR.3.1:	 Adapt proceedies to apply them to a new context. Use feedback to improve efficiency when performing calculations.
	Clarifications:
	Teachers who encourage students to complete tasks with mathematical fluency:
	Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
	 Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	 Provide opportunities for students to reflect on the method they used and determine if a more encient method could have been used. Engage in discussions that reflect on the mathematical thinking of self and others.
	Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
	Communicate mathematical ideas, vocabulary and methods effectively.
	Analyze the mathematical thinking of others.
	 Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task.
	 Necognize en ors and suggest now to conjectly solve the task. Justify results by explaining methods and processes.
MA.K12.MTR.4.1:	Construct possible arguments based on evidence.

	 Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.

	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
	Evaluate how environment and personal health are interrelated.
HE.912.C.1.3:	Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
	Analyze the impact of citizen participation as a means of achieving political and social change.
SS.912.C.2.8:	Clarifications: Examples are e-mail campaigns, boycotts, blogs, podcasts, protests, demonstrations, letters to editors.

General Course Information and Notes

VERSION DESCRIPTION

The course content includes: an introduction to energy technology, renewable energy in a sustainable future, the science behind climate change, environmental impacts and economics, and careers in renewable energy. Students will be introduced to different types of renewable energy technologies, how they work, their advantages, disadvantages, and limitations. The types of renewable energies and technologies studied include: wind energy, solar (thermal and photovoltaic), hydro-electric, bio-energy, tidal power, wave energy, geothermal energy, ocean thermal, fuel cells, heat pump systems, and high voltage DC energy transport. The availability and integration of these energy types and technologies are also studied to understand how renewable energy can work as a compliment to and replacement for conventional technologies.

GENERAL NOTES

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

 Course Number: 2003500
 Course S Grade Group: Grades 9 to 12 and Adult

 Courses Number: 2003500
 Education Courses > Subject: Science > SubSubject:

 Physical Sciences >
 Abbreviated Title: RENEWABLE ENERGY 1 H

 Number of Credits: One (1) credit
 Course Length: Year (Y)

 Course Attributes:
 • Honors

 Course Status: State Board Approved
 Course Level: 3

 Grade Level(s): 9,10,11,12
 State Stat

Educator Certifications

Chemistry (Grades 6-12) Physics (Grades 6-12)

Renewable Energy 1 Honors (#2003500) 2023 - And Beyond

Name	Description
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.
SC.912.E.5.9:	Analyze the broad effects of space exploration on the economy and culture of Florida.
SC.912.E.6.4:	Analyze how specific geologic processes and features are expressed in Florida and elsewhere.
SC.912.E.6.6:	Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies.
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
SC.912.E.7.2:	Analyze the causes of the various kinds of surface and deep water motion within the oceans and their impacts on the transfer of energy between the poles and the equator.
SC.912.E.7.3:	Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.
SC.912.E.7.4:	Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans.
SC.912.E.7.7:	Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.
SC.912.E.7.8:	Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually and collectively.
SC.912.E.7.9:	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.12:	Discuss the political, social, and environmental consequences of sustainable use of land.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.14:	Assess the need for adequate waste management strategies.
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
SC.912.L.17.17:	Assess the effectiveness of innovative methods of protecting the environment.
SC.912.L.17.18:	Describe how human population size and resource use relate to environmental quality.
SC.912.L.17.19:	Describe how different natural resources are produced and how their rates of use and renewal limit availability.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.

SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus a scientific theory represents the most powerful explanation scientists have to offer	I
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.	
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.	
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.	
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.	
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.	
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.	
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.	
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.	
SC.912.P.10.11:	Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues.	1
SC.912.P.10.14:	Differentiate among conductors, semiconductors, and insulators.	
SC.912.P.10.15:	Investigate and explain the relationships among current, voltage, resistance, and power.	
SC.912.P.10.16:	Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and electric fields, and their application to modern technologies.	С
SC.912.P.10.17:	Explore the theory of electromagnetism by explaining electromagnetic waves in terms of oscillating electric and magnetic fields.	
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.	
	Mathematicians who participate in effortful learning both individually and with others:	
	Analyze the problem in a way that makes sense given the task.	
	 Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. 	
	 Stay engaged and maintain a positive mindset when working to solve tasks. 	
	Help and support each other when attempting a new method or approach.	
MA.K12.MTR.1.1:	Clarifications:	
	Teachers who encourage students to participate actively in effortful learning both individually and with others:	
	Cultivate a community of growth mindset learners.	
	Foster perseverance in students by choosing tasks that are challenging.	
	Develop students' ability to analyze and problem solve.	
	Recognize students errort when solving challenging problems.	
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:	
	Build understanding through modeling and using manipulatives.	
	Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.	
	 Progress from modeling problems with objects and drawings to using algorithms and equations. 	
	Express connections between concepts and representations.	
MA.K12.MTR.2.1:	Choose a representation based on the given context or purpose.	
	Clarifications:	
	Help students make connections between concepts and representations	
	 Provide opportunities for students to use manipulatives when investigating concepts. 	
	 Guide students from concrete to pictorial to abstract representations as understanding progresses. 	
	• Show students that various representations can have different purposes and can be useful in different situations.	
	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:	
	 Select officient and appropriate methods for solving problems within the siver content 	
	 Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. 	
	Complete tasks accurately and with confidence	
	Adapt procedures to apply them to a new context.	
MA.K12.MTR.3.1:	Use feedback to improve efficiency when performing calculations.	
	Clarifications:	
	Teachers who encourage students to complete tasks with mathematical fluency:	
	Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.	
	Offer multiple opportunities for students to practice efficient and generalizable methods.	
	 Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used. 	
	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:	
	Communicate mathematical ideas, vocabulary and methods effectively.	
	Analyze the mathematical thinking of others.	
	Compare the efficiency of a method to those expressed by others.	
	Recognize errors and suggest how to correctly solve the task.	
MA.K12.MTR.4.1:	Justify results by explaining methods and processes.	
	Construct possible arguments based on evidence.	

	 Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.

ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
HE.912.C.1.3:	Evaluate how environment and personal health are interrelated. Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
SS.912.CG.2.7:	 Analyze the impact of civic engagement as a means of preserving or reforming institutions. Students will identify legal methods that citizens can use to promote social and political change (e.g., voting, peaceful protests, petitioning, demonstrations, contacting government offices). Students will identify historical examples of citizens achieving or preventing political and social change through civic engagement (e.g., the Abolitionist Movement).

General Course Information and Notes

VERSION DESCRIPTION

The course content includes: an introduction to energy technology, renewable energy in a sustainable future, the science behind climate change, environmental impacts and economics, and careers in renewable energy. Students will be introduced to different types of renewable energy technologies, how they work, their advantages, disadvantages, and limitations. The types of renewable energies and technologies studied include: wind energy, solar (thermal and photovoltaic), hydro-electric, bio-energy, tidal power, wave energy, geothermal energy, ocean thermal, fuel cells, heat pump systems, and high voltage DC energy transport. The availability and integration of these energy types and technologies are also studied to understand how renewable energy can work as a compliment to and replacement for conventional technologies.

GENERAL NOTES

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access

an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2003500

Number of Credits: One (1) credit

Course Type: Elective Course Course Status: Draft - Course Pending Approval Grade Level(s): 9,10,11,12 Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Physical Sciences > Abbreviated Title: RENEWABLE ENERGY 1 H Course Length: Year (Y) Course Attributes: • Honors Course Level: 3

Educator Certifications

Chemistry (Grades 6-12) Physics (Grades 6-12)

Principles of Technology 1 (#2003600) 2015 - 2022 (current)

Name	Description
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations, and reading to justify these explanations to others, Communicate results of scientific investigations, and
	The Evaluate the ments of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.
SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability. Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as
30.712.11.2.3.	they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	range of phenomena; thus, a scientific theory represents the most powerful explanation scheme to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.8.1:	Differentiate among the four states of matter.
SC.912.P.8.4:	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.
SC.912.P.10.3:	Compare and contrast work and power qualitatively and quantitatively.
SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter.
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.
SC.912.P.10.6:	Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum.
SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).

SC.912.P.10.13:	Relate the configuration of static charges to the electric field, electric force, electric potential, and electric potential energy.		
SC.912.P.10.14:	Differentiate among conductors, semiconductors, and insulators.		
SC.912.P.10.15:	Investigate and explain the relationships among current, voltage, resistance, and power.		
SC.912.P.12.1:	Distinguish between scalar and vector quantities and assess which should be used to describe an event.		
SC.912.P.12.2:	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.		
SC.912.P.12.3:	Interpret and apply Newton's three laws of motion.		
SC.912.P.12.4:	Describe how the gravitational force between two objects depends on their masses and the distance between them.		
SC.912.P.12.5:	Apply the law of conservation of linear momentum to interactions, such as collisions between objects.		
LAFS.910.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.		
LAFS.910.RST.1.2:	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.		
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.		
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.		
LAFS.910.RST.2.5:	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).		
LAFS.910.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.		
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.		
LAFS.910.RST.3.8:	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.		
LAFS.910.RST.3.9:	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.		
LAFS.910.RST.4.10:	By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9– 10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence		
LAFS.910.SL.1.1:	from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed.		
	 c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented. 		
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.		
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.		
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.		
LAFS.910.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.		
	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) 		
LAFS.910.WHST.1.1:	 and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. Provide a concluding statement or section that follows from or supports the argument presented. 		
	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. 		
LAFS.910.WHST.1.2:	 c. Use varied transitions and sentence structures to link the major sections of the text, create conesion, and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic). 		
LAFC 010 MULCE 0.4	Deeduce along and appendix writing in which the device rest and restriction and the second state is a second state of the second state is a second state of the		
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.		

LAFS.910.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
LAFS.910.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.910.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.910.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star
MAFS.K12.MP.1.1:	Make sense of problems and persevere in solving them. Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting
MAFS.K12.MP.4.1:	Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful

MAFS.K12.MP.6.1:	about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y. Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The course also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 2003600

Number of Credits: One (1) credit Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Educator Certifications

Science (Secondary Grades 7-12) Physics (Grades 6-12) Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Physical Sciences > Abbreviated Title: PRINC TECH 1 Course Length: Year (Y) Course Level: 2

Principles of Technology 1 (#2003600) 2022 - And Beyond

Name	Description
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.
SC.912.L.17.15: SC.912.N.1.1:	 Discuss the effects of technology on environmental quality. Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations that explicate or describe natural phenomena (inferences),
	 Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as
SC 012 N 2 2	questions addressed by other ways of knowing, such as art, prillosophy, and religion.
30.912.10.2.3:	Explain that scientific knowledge is both durable and rebust and energies cleantific knowledge can change because it is often examined and
SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.8.1:	Differentiate among the four states of matter.
SC.912.P.8.4:	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.
SC.912.P.10.3:	Compare and contrast work and power qualitatively and quantitatively.
SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter
SC 912 P 10 5	Relate temperature to the average molecular kinetic energy
SC.912.P.10.6	Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum
SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).

SC.912.P.10.13:	Relate the configuration of static charges to the electric field, electric force, electric potential, and electric potential energy.		
SC.912.P.10.14:	Differentiate among conductors, semiconductors, and insulators.		
SC.912.P.10.15:	Investigate and explain the relationships among current, voltage, resistance, and power.		
SC.912.P.12.1:	Distinguish between scalar and vector quantities and assess which should be used to describe an event.		
SC.912.P.12.2:	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.		
SC.912.P.12.3:	Interpret and apply Newton's three laws of motion.		
SC.912.P.12.4:	Describe how the gravitational force between two objects depends on their masses and the distance between them.		
SC.912.P.12.5:	Apply the law of conservation of linear momentum to interactions, such as collisions between objects.		
MA.K12.MTR.1.1:	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach. Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. 		
	Recognize students' effort when solving challenging problems.		
MA.K12.MTR.2.1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. 		
	Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.		
MA.K12.MTR.3.1:	 Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. 		
	 Ose recudate to improve enclency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used. 		
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. 		
	 Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers. 		
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts.		

MA.K12.MTR.5.1:	Look for similarities among problems.
	 Connect solutions of problems to more complicated large-scale situations.
	Clarifications:
	Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:
	 Support students to develop generalizations based on the similarities found among problems.
	 Provide opportunities for students to create plans and procedures to solve problems.
	• Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
	Estimate to discover possible solutions.
	Use benchmark quantities to determine if a solution makes sense.
	Check calculations when solving problems.
	Verify possible solutions by explaining the methods used.
MA.K12.MTR.6.1:	Evaluate results based on the given context.
	Clarifications:
	 Leachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving
	 Prompt students to continually ask "Does this solution make sense? How do you know?"
	 Reinforce that students check their work as they progress within and after a task.
	Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts.
	Mathematicians who apply mathematics to real-world contexts:
	Connect mathematical concepts to everyday experiences.
	Use models and methods to understand, represent and solve problems.
	Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or
MA.K12.MTR.7.1:	efficiency.
	Clarifications:
	Provide opportunities for students to create models, both concrete and abstract, and perform investigations
	 Challenge students to question the accuracy of their models and methods.
	 Support students as they validate conclusions by comparing them to the given situation.
	Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	Clarifications:
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	 Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly guoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide.
ELA.K12.EE.1.1:	 Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
ELA.K12.EE.1.1:	 Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation.
ELA.K12.EE.1.1:	 Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.1.1:	 Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.1.1:	 Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.1.1: ELA.K12.EE.2.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: Clarifications:
ELA.K12.EE.1.1: ELA.K12.EE.2.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.1.1: ELA.K12.EE.2.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension.
ELA.K12.EE.1.1: ELA.K12.EE.2.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: See Text complexity marks inferences before the unords inference on interduced. Violagerates chudents will accurate supports will accurate support comprehension.
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the gif smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide reference by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make Inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening ski
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girls milling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the grid smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening ski
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1: ELA.K12.EE.4.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropritate collaborative techniques and active listening sk
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1: ELA.K12.EE.4.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropritate collaborative techniques and active listening sk
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1: ELA.K12.EE.4.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when en
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1: ELA.K12.EE.4.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric. Make Inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening ski
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1: ELA.K12.EE.4.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complexity bands and a text complexity rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smilling" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1: ELA.K12.EE.4.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Clarifications: See Text Complexitly for grade-level complexitly bands and a text complexitly rubric. Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1: ELA.K12.EE.4.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, praphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complex texts proficiently. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. C
ELA.K12.EE.1.1: ELA.K12.EE.2.1: ELA.K12.EE.3.1: ELA.K12.EE.4.1: ELA.K12.EE.5.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ. Clarifications: Students will make inferences borger the words infer or inference are introduced. Kindergarten students will anywer questions like "Why is the girl smiling" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond. Use appropriate

	Use appropriate voice and tone when speaking or writing.	
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.	
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.	
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.	

General Course Information and Notes

GENERAL NOTES

Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course	Number:	2003600
--------	---------	---------

Number of Credits: One (1) credit Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Physical Sciences > Abbreviated Title: PRINC TECH 1 Course Length: Year (Y) Course Level: 2

Educator Certifications

Science (Secondary Grades 7-12) Physics (Grades 6-12)

Florida's Preinternational Baccalaureate Chemistry 1 (#2003800) 2015 - 2022 (current)

Name	Description
SC.912.N.1.1:	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5: SC.912.N.2.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome. Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations
SC 912 N 3 2	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships
SC 912 N 3 5	Describe the function of models in science, and identify the wide range of models used in science
SC 912 N / 1	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making
SC 912 P 8 1	Differentiate among the four states of matter
SC.912.P.8.2:	Differentiate between physical and chemical properties and physical and chemical changes of matter.
SC.912.P.8.3:	Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes were necessitated by experimental evidence.
SC.912.P.8.4:	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC.912.P.8.5:	Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.
SC.912.P.8.6:	Distinguish between bonding forces holding compounds together and other attractive forces, including hydrogen bonding and van der Waals forces.
SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.
SC.912.P.8.8:	Characterize types of chemical reactions, for example: redox, acid-base, synthesis, and single and double replacement reactions.
SC.912.P.8.9:	Apply the mole concept and the law of conservation of mass to calculate quantities of chemicals participating in reactions.
SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.
SC.912.P.10.6:	Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum.
SC.912.P.10.7:	Distinguish between endothermic and exothermic chemical processes.
SC.912.P.10.9:	Describe the quantization of energy at the atomic level.
SC.912.P.10.12:	Differentiate between chemical and nuclear reactions.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.12.10:	Interpret the behavior of ideal gases in terms of kinetic molecular theory.
SC.912.P.12.11:	Describe phase transitions in terms of kinetic molecular theory.
SC.912.P.12.12:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.
SC.912.P.12.13:	Explain the concept of dynamic equilibrium in terms of reversible processes occurring at the same rates. Make sense of problems and persevere in solving them. Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the

MAFS.K12.MP.1.1:	original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
MAFS.K12.MP.3.1:	Construct viable arguments and critique the reasoning of others. Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting Model with mathematics
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
MAFS.K12.MP.7.1:	Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression x^2 + 9x + 14, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y. Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a

MAFS.	K1	2.N	1P.	8.	1:

repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation (y - 2)/(x - 1) = 3. Noticing the regularity in the way terms cancel when expanding (x - 1)(x + 1), $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

Standard Relation to Course: Supporting

General Course Information and Notes

GENERAL NOTES

Special Note. Pre-IB courses have been created by individual schools or school districts since before the MYP started. These courses mapped backwards the Diploma Programme (DP) to prepare students as early as age 14. The IB was never involved in creating or approving these courses. The IB acknowledges that it is important for students to receive preparation for taking part in the DP, and that preparation is the MYP. The IB designed the MYP to address the whole child, which, as a result, has a very different philosophical approach that aims at educating all students aged 11-16. Pre-IB courses usually deal with content, with less emphasis upon the needs of the whole child or the affective domain than the MYP. A school can have a course that it calls "pre-IB" as long as it makes it clear that the course and any supporting material have been developed independently of the IB. For this reason, the school must name the course along the lines of, for example, the "Any School pre-IB course".

The IB does not recognize pre-IB courses or courses labeled IB by different school districts which are not an official part of the IBDP or IBCC curriculum. Typically, students enrolled in grade 9 or 10 are not in the IBDP or IBCC programmes.

https://ibanswers.ibo.org/app/answers/detail/a_id/5414/kw/pre-ib. Florida's Pre-IB courses should only be used in schools where MYP is not offered in order to prepare students to enter the IBDP. Teachers of Florida's Pre-IB courses should have undergone IB training in order to ensure seamless articulation for students within the subject area.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades Prek to 12 Education	
Course Number 2002200	Courses > Grade Group: Grades 9 to 12 and Adult	
Course Number: 2003800	Education Courses > Subject: Science > SubSubject:	
	Chemistry >	
	Abbreviated Title: FL PRE-IB CHEM 1	
Number of Credits: One (1) credit	Course Length: Year (Y)	
	Course Attributes:	
	Honors	
Course Type: Core Academic Course	Course Level: 3	
Course Status: Course Approved		
Grade Level(s): 9,10		
Graduation Requirement: Equally Rigorous Science		

Educator Certifications

Science (Secondary Grades 7-12)	
Chemistry (Grades 6-12)	

Equivalent Courses

2003340-Chemistry 1
2003350-Chemistry 1 Honors

Florida's Preinternational Baccalaureate Chemistry 1 (#2003800) 2022 - And Beyond

Name	Description
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:
	1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
	5. Plan investigations. (Design and evaluate a scientific investigation).
SC.912.N.1.1:	6 Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	depending and interpretation of graphical representations of data including data tables and graphs). (Collect data or evidence in an
	organized way. Properly use instruments, equipment, and materials (e.g., scales, proheware, meter sticks, microscopes, computers) including
	setup calibration technique maintenance and storage)
	7 Dose answers, evolutions, or descriptions of events
	8. Concrate explanations that explicate or describe natural phenomena (inferences)
	0. Use appropriate ovidence and reasoning to justify these explanations to others
	 Ose appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and
	10. Communicate results of sciencific investigations, and
	The Evaluate the ments of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they
SC.912.N.2.5:	make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as
	they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC 012 N 2 2	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those
30.912.11.3.3.	relationships.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.P.8.1:	Differentiate among the four states of matter.
SC.912.P.8.2:	Differentiate between physical and chemical properties and physical and chemical changes of matter.
SC 012 D 0 2.	Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes
56.712.1.0.5.	were necessitated by experimental evidence.
SC 912 P 8 /·	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons,
56.712.1.0.4.	and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC.912.P.8.5:	Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.
SC.912.P.8.6:	Distinguish between bonding forces holding compounds together and other attractive forces, including hydrogen bonding and van der Waals forces.
SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.
SC.912.P.8.8:	Characterize types of chemical reactions, for example: redox, acid-base, synthesis, and single and double replacement reactions.
SC.912.P.8.9:	Apply the mole concept and the law of conservation of mass to calculate quantities of chemicals participating in reactions.
SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.
SC.912.P.10.6:	Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum.
SC.912.P.10.7:	Distinguish between endothermic and exothermic chemical processes.
SC.912.P.10.9:	Describe the quantization of energy at the atomic level.
SC.912.P.10.12:	Differentiate between chemical and nuclear reactions.
SC 012 D 10 10	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength,
3C.912.P.10.10.	frequency, and energy, and relate them to phenomena and applications.
SC.912.P.12.10:	Interpret the behavior of ideal gases in terms of kinetic molecular theory.
SC.912.P.12.11:	Describe phase transitions in terms of kinetic molecular theory.
SC.912.P.12.12:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.
SC.912.P.12.13:	Explain the concept of dynamic equilibrium in terms of reversible processes occurring at the same rates.
	Mathematicians who participate in effortful learning both individually and with others:
	Analyze the problem in a way that makes sense given the task.
	Ask questions that will help with solving the task.
	Build perseverance by modifying methods as needed while solving a challenging task.
	 Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach.
-----------------	--
MA.K12.MTR.1.1:	Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	 Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	 Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense.

MA.K12.MTR.6.1:	 Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
	Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
Ma K12 MTR 7 1-	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
	 Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
ELA.K12.EE.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.
ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
L	

General Course Information and Notes

GENERAL NOTES

Special Note. Pre-IB courses have been created by individual schools or school districts since before the MYP started. These courses mapped backwards the Diploma Programme

(DP) to prepare students as early as age 14. The IB was never involved in creating or approving these courses. The IB acknowledges that it is important for students to receive preparation for taking part in the DP, and that preparation is the MYP. The IB designed the MYP to address the whole child, which, as a result, has a very different philosophical approach that aims at educating all students aged 11-16. Pre-IB courses usually deal with content, with less emphasis upon the needs of the whole child or the affective domain than the MYP. A school can have a course that it calls "pre-IB" as long as it makes it clear that the course and any supporting material have been developed independently of the IB. For this reason, the school must name the course along the lines of, for example, the "Any School pre-IB course".

The IB does not recognize pre-IB courses or courses labeled IB by different school districts which are not an official part of the IBDP or IBCC curriculum. Typically, students enrolled in grade 9 or 10 are not in the IBDP or IBCC programmes.

https://ibanswers.ibo.org/app/answers/detail/a_id/5414/kw/pre-ib. Florida's Pre-IB courses should only be used in schools where MYP is not offered in order to prepare students to enter the IBDP. Teachers of Florida's Pre-IB courses should have undergone IB training in order to ensure seamless articulation for students within the subject area.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2002200	Courses > Grade Group: Grades 9 to 12 and Adult
course Number: 2003800	Education Courses > Subject: Science > SubSubject:
	Chemistry >
	Abbreviated Title: FL PRE-IB CHEM 1
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
Course Type: Core Academic Course	Course Level: 3
Course Status: State Board Approved	
Grade Level(s): 9,10	

Educator Certifications

Graduation Requirement: Equally Rigorous Science

Science (Secondary Grades 7-12)	
Chemistry (Grades 6-12)	

Equivalent Courses

2003340-Chemistry 1	
2003350-Chemistry 1 Honors	

International Baccalaureate Chemistry 1 (#2003805) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

	Course Path: Section: Grades Prek to 12 Education
urse Number: 200280E	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2003803	Education Courses > Subject: Science > SubSubject:
	Chemistry >
	Abbreviated Title: IB CHEMISTRY 1
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	International Baccalaureate (IB)
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Graduation Requirement: Equally Rigorous Science	

Science (Secondary Grades 7-12)	
Chemistry (Grades 6-12)	

International Baccalaureate Chemistry 2 (#2003810) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2002910	Courses > Grade Group: Grades 9 to 12 and Adult
Course Multiper. 2003810	Education Courses > Subject: Science > SubSubject:
	Chemistry >
	Abbreviated Title: IB CHEM 2
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	 International Baccalaureate (IB)
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

ccience (secondary Grades 7-12)	
Chemistry (Grades 6-12)	

International Baccalaureate Chemistry 3 (#2003820) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2003820	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2003020	Education Courses > Subject: Science > SubSubject:
	Chemistry >
	Abbreviated Title: IB CHEM 3
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	 International Baccalaureate (IB)
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Educator Certifications

Science (Secondary Grades 7-12)	
Chemistry (Grades 6-12)	

Equivalent Courses

2003360-Chemistry 2 Honors

International Baccalaureate Mid Years Prog Chemistry (#2003830) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2003830	Courses > Grade Group: Grades 9 to 12 and Adult
	Education Courses > Subject: Science > SubSubject:
	Chemistry >
	Abbreviated Title: IB MYP CHEM
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	International Baccalaureate (IB)
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Chemistry (Grades 6-12)
cience (Secondary Grades 7-12)
/liddle Grades General Science (Middle Grades 5-9)

Florida's Preinternational Baccalaureate Physics 1 (#2003836) 2015 - 2022 (current)

Course Standards

Name	Description
SC.912.E.5.2:	Identify patterns in the organization and distribution of matter in the universe and the forces that determine them.
SC.912.E.5.6:	Develop logical connections through physical principles, including Kepler's and Newton's Laws about the relationships and the effects of Earth, Moon, and Sun on each other.
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:
	1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
SC 012 N 1 1.	5. Plan investigations, (Design and evaluate a scientific investigation).
30.912.10.1.1.	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	set-up, calibration, technique, maintenance, and storage).
	 Pose answers, explanations, or descriptions or events, Concrate evelopetions that evelopetic or describe natural phenomena (inforences).
	 Orientate explanations that explicate of describe natural phenomena (interences), Use appropriate evidence and reasoning to justify these explanations to others
	10 Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
	······································
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.2:	identify which questions can be answered inrough science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC 912 N 2 3	Identify examples of pseudoscience (such as astrology, phrenology) in society
0017121112101	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and
SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger,
	Describe instances in which scientists' varied backgrounds talents, interests, and goals influence the inferences and thus the evolutions that they
SC.912.N.2.5:	make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as
	they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
CO 010 N 0 1	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial
SC.912.N.3.1:	range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.P.8.1:	Differentiate among the four states of matter.
SC.912.P.8.3:	Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes were necessitated by experimental evidence.
SC.912.P.8.4:	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.
SC.912.P.10.3:	Compare and contrast work and power gualitatively and guantitatively.
SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.

C 1925 P. 10.5. Example between end-dermined entermined	SC.912.P.10.6:	Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum.
S212.2.10.0 Explain tendpris de la alexeminia the effecting of accesses that covers a large to exist. S212.5.10.1 Explain tendpris and exage of the tend incompanion of same of tendpris and exage of the tend incompanion. S212.5.10.1 Explain tendpris and exage of the tend incompanion of same of tendpris and exage of	SC.912.P.10.7:	Distinguish between endothermic and exothermic chemical processes.
SC122.01.10.10 Conserve for magnetize and many of the four fundamental forces gravefundamental access during fundamental access during	SC.912.P.10.8:	Explain entropy's role in determining the efficiency of processes that convert energy to work.
SQ 212.10.13. Relia the configuration of static charges for feed sector. Date sector bare bare sector ba	SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).
S2 2010.10.4 Differentials arrange conductors, semicorductor, sem	SC.912.P.10.13:	Relate the configuration of static charges to the electric field, electric force, electric potential, and electric potential energy.
 EX322.10.10.10. Eventsgela and aging the indexed program and anyone fails, and in charging regulation and inclusion index fails, and that applications to mage in all strategies of the integration of mages. Events and exact all strategies and anyone fails, and that are anyonic fails. Eventson to the indexed program of decision agricultury comparison and anyone fails. Eventson to the indexed program of decision agricultury comparison and anyone fails. Eventson to the indexed program of decision agricultury comparison and anyone fails. Eventson to the indexed program of decision agricultury comparison agricultury comparison and anyone fails. Eventson to the indexed program of decision agricultury comparison agricultury comparison agricultury. Eventson to the indexed program of the indexed program of the index indexed program of the indexe indexed program of the indexed program of the indexe indexed program of the indexe indexed program of the indexe indexed program of the indexed program of the indexe indexed program of the indexe indexed program of the indexe indexed program of the indexed program of the indexe indexed program of the indexed program of the indexe indexed program of the indexe indexed program of the indexed program of the indexe indexe	SC.912.P.10.14:	Differentiate among conductors, semiconductors, and insulators.
CP12 P10.16 Cplant the relationship between moning intragenet of relations, well as changing magnets (fields, and electric (Felds, and electric))). S2712 710 20 Devicite file magnetize the parts in fragments in ad optication. S2712 710 22 Science (Felds, and electric)). Science (Felds, and electri). Science (Felds, and electric)).	SC.912.P.10.15:	Investigate and explain the relationships among current, voltage, resistance, and power.
0.92.9.01.7. Expension the sharps of instrumeny memory in the dependence of the second s	SC.912.P.10.16:	Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and electric fields, and their application to modern technologies
Display Explore the theory of exclosing action by comparising and contrasting the distribution park is guided in the exclosing action in them of wavelength. 0:92.9 10.02. Display the the theory of exclosing action is exclusion. Exclosing action is exclusion. 0:92.9 10.02. Contrast is given and reads the is guided in a single firm and manual hear them approprints actiong its action. Exclosing action action. 0:92.9 10.02. Contrast is given and exclosing its action action. Exclosing action ac	SC.912.P.10.17:	Explore the theory of electromagnetism by explaining electromagnetic waves in terms of oscillating electric and magnetic fields.
Description of ensure the properties of weeks and explain the relationships among them and how these properties througe which the wave moves for the marker modes is a source of a receiver. Sci 72:11 10:21. Our lathway describe the shift in requirecy insourd or electronagnetic waves due to the marker mode of a source of a receiver. Sci 72:12 12. Destroyable between safe and vector quantities and all assess which should be used to describe an event. Sci 72:12 12. Destroyable between safe and vector quantities and all assess which should be used to describe an event. Sci 72:12 12. Destroyable between safe and vector quantities and all assess which should be used to describe an event. Sci 72:12 12. Describe here in the general independence of the describe an event. Sci 72:12 12. Describe here independence on the momentum to interactions, such as collabore between cliques. Sci 72:12 12. Apply the avent of concentration of times of momentum to interactions. Sci 72:12 12. Sci 72:12 2. Apply the avent of concentration of time intermomentum to interactions, such as collabore intervence on marker heads for the finance of regression of the describe the marker heads and the describe the marker heads and the describe the marker head in the intervence on the finance of regression of the describe the marker head in the intervence on the finance of regression of the describe the marker heads and the describe the marker heads and the describes the marker heads the describes the marker heads and the describes the marker heads the describes the describes the marker heads the describes the describes the marker heads theads the describes the d	SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SUP121121 Qualitatively describe the fittin frequency in sound or electromapet zweek due to the relative motion of a source or a receiver. SUP121022 Description by diagrams and use think in frequency in sound or electromapet zweek due to the relative motion of a source of the research and where a distribution of the source of the research and where a distribution of the source of the research and the research as functions of them. SUP12123 Interpret and apply fewore the research bases of motion. SUP12124 SUP12124 Duals telefore apply fewore the research bases of the relative memory and the distance bases on the distance bases on the distance bases on the distance bases of the distance bases on the distance	SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.
EX 09 20122 Construct my diagrams mut out his lows and minitro regulations of heads have images formed by lowes, and minutes. EX 09 20132 Analyse the motion of an object his more of the position, vieledity, and acceleration (Win regulate) that were and the position of the characterization. EX 09 20132 Analyse the motion of an object his more of the position is wor object to be were not been set to explore the characterization. EX 09 20132 Description that were gravitational torce between two objects depends on their masses and the characterization. EX 09 20132 Description that horing travels is tasker than the speed of light in vacuum which is the same ton all observers no matter how they of the light source are moving. EX 09 20132 Description that horing travels is fasker than the speed of light in vacuum which is the same ton all observers no matter how they of the light source are moving. EX 09 20132 Description that horing travels of decleration and technical lists, atlending to impact that are muta-senalitic time. It has a that makes, and to are gravels that time, tenny that and accurate terms. EX 0112.2811.12. Description that horing travels of decleration and technical lists, atlending to impact and lists. EX 0112.2812.12. Deferming the mental cost and vacuum decleration. EX 0112.2812.12. Deferming the mental cost and vacuum decleration lists and vacuum decleration lists. EX 0112.2812.12. Fallow protocolsta scientin the betat. Ex 0112.1212.121.1	SC.912.P.10.21:	Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.
CV92E121: Distinguish between scaling and vector quantifies and assess which include be used to decortile an event. CV92E122: Analyze the model of an degot in times of its position vectors, and acceleration with respect to a frame of inference in a functions of the position vectors. CV92E122: Describe how its graduational formed on the position vectors. CV92E122: Describe how its graduational formed membrane in the inferactions, such as collisions between them. CV92E122: Describe how its graduational formed membrane in inferactions, such as collisions between them. CV92E122: Describe how its graduation and receiver is graduation membrane. CV92E122: Describe how its position and receiver is graduation membrane. CV92E123: Respective how its suck are a limiting passe of interaction signature wer monoling. CV92E124: Respective how its suck are a limiting passe of interaction signature membrane. AV5.1112.8E11:1 Dissective how its suck are a limiting passe of a limit membrane. AV5.1112.8E11:2 Dissective how its suck are a limiting passe of a limit membrane. AV5.1112.8E11:1 Dissective how its suck are a limiting passe of a limit membrane. AV5.1112.8E11:1 Dissective how its suck are a limiting passe of limiting and passe suck are a graduation and passe and the suck are a graduation and passe suck are a graduation and passe and limiting and passe suck are a	SC.912.P.10.22:	Construct ray diagrams and use thin lens and mirror equations to locate the images formed by lenses and mirrors.
SC 912 P12.2. Analyse the motion of an object in terms of its position, velocity, and acceleration velocity not propert to a frame of inference) as functions of an object in terms of its position velocity and acceleration velocity. SC 912 P12.3. Describe how the gravitational innex between two objects depends on their messes and the distance between them. SC 912 P12.4. Qualitatively apply the concept of angular momentume in the interactions, such accelerations between them. SC 912 P12.4. Recograte that the object is a set initial gase of a list in its special theory of beautively at genesis that are much smaller than the special of a list in its special theory of beautively at genesis that are much smaller than the special of list in its special theory of beautively at genesis that are much smaller than the special of list in its special theory of beautively at genesis that are much smaller than the special of list in its special theory of beautively at genesis that are much smaller than the special of list in its special theory of beautively at genesis that are much smaller than the special of list in its special theory of beautively at genesis that are much smaller and to a list by paraphraping the stat status in a list in the source. AF3 1112 BS1 1.2. Determine the murain dispect in conduction of a list is unmarker complex consepts, processes, or information prevented in a list by paraphraping the stat status is analyzed the special much special of list is statistical status analyzed the special status is analyzed in text. AF3 1112 BS1 2. Determine the menang of symptics processes (keg terrors), and o	SC.912.P.12.1:	Distinguish between scalar and vector quantities and assess which should be used to describe an event.
 SC 912 P123. Interpret and goly Movem's three laws of movies. SC 912 P123. Describe how the gravitational for so between two objects depends on their masses and the datavece between them. SC 912 P124. Apply the law of commensume to interactions, such as collisions between depicts. SC 912 P125. Apply the law of commensume to interactions, such as collisions between depicts. SC 912 P126. Qualitative gap of the concept of angle in momentum. SC 912 P127. Recorpts that nothing trevels takter than the speed of light in vacuum witch is the same for all observers no matter how they or the light source are moving. SC 912 P128. Recorpts that intering travels takter than the speed of light in vacuum witch is the same for all observers no matter how they conting light source are moving. SC 912 P128. Recorpts that intering the data and engry depend on the frame of reference. CL 912 P129. The conting the control decay of conclusions of a test: summarize complex concepts, processes, or information presented in a test by paraphroxing them in simple to sill accurate terms. Af \$1112 R51 1.2. Determine the control ideas or conclusions of a test: summarize complex concepts, processes, or information presented in a test beat y paraphroxing them in maning of symbols. Key firms, and other down in specific words and phraves as they are used in a specific scientific or itension. Af \$1112 R51 2.6. Analyze how the test structures information or ideas into categories or theracching, describing a processes, or information and test is unification in the same of the source or information or ideas. Af \$1112 R51 2.6. Analyze how the test structures information or ideas into categories or theracching, describing a network and phrases as they are used in a specific scientific or inclusion and metric in device formation and metric in device formation and metric in device formation and metric i	SC.912.P.12.2:	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.
 Sci 912 F124. Describe how the gravitational from between two objects depends on the mescaces, such as objects. Sci 912 F125. Apply the low conservation of linear momentum. Sci 912 F126. Description of angular momentum in mercelicins, such as objects. Sci 912 F127. Recognize that including trueble faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving. Sci 912 F128. Description that Neoton's Laws are a limiting case of Enclaint's Speed Howy of Belativity at speeds that are much smaller than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving. Cl 912 F128. Description that Neoton's Laws are a limiting case of Enclaint's Speed Howy of Belativity at speeds that are much smaller than the support of research support and space transmission that that a manufate complex cancepts, processes, or information presented in a text by paraphrasing them is simpler to all laws are allower when carrying out operiments, taking mesurements, or performing technical texts analyzes the speed for results based on exploration in the text. Aris 1112 RST 1.4. Determine the messaring of spends, toy terms, and other domain specific words and princes is they are used in a specific calefistic to retainical code of the information or ideas. Aris 1112 RST 1.7. Advape that the data sucurate information rules and to categories or historic of calescaling and explored that specific calefistic or text and and text and paraphrasing the antice and specific words and paraphrasing theoremotic in the text. Aris 1112 RST 1.7. Advape that the data sucurate information rules and is a categories or historic or discussing an experiment in a text. Builtying important itsues that information or ideas and to categories or historic or discussing an experint is attract. Builtying important is sucress of information	SC.912.P.12.3:	Interpret and apply Newton's three laws of motion.
 Sci 912-122. Apply the law of conservation of linear momentum to interactions, such as cellisions between objects. Sci 912-123. Qualitative apply the concept of anguer momentum. Sci 912-124. Recognize that nothing travels taster than the speed of light in vacuum within is the same for all observers no matter how they or the light source are moving. Sci 912-123. Recognize that flexitoris laws are a limiting case of linear in special theory of flexitory at lexitors. Sci 912-124. Recognize that flexitoris laws are a limiting case of linear in special moves. All's 1112-851-12. Determine the central ideas or conclusions of a fact: summatize complex concepts, processes, or information presented in a fact by paraproximal them is equed in light. Sci 912-125. Analyze how the text structures information or ideas into a carrying out opertiments, taking measurements, or performing technical lasts, analyze the specific matule and prevides in the second. All's 1112-851-12. Determine the meaning of symbols, key terms, and other domain specific words and phrases as they are used in a peerfit scientific or technical concert relevant to grade 11-112 tests and topics. Analyze how the test structures information or ideas into categories on therarchise, demonstrating understanding of the information or ideas into categories on therarchise, demonstrating understanding of the information or ideas information presented in diverse formatis and meaning on a categorie and under method with the second on ideas and presented in diverse formation or experiment in a loce. Henrifying important issues that terms is a second on information presented in diverse formation diverse that and meaning (e.g., auntiltable and concerto-preditig or diverse of information diverse transmiss and meaning the data when pessible and concerobrating or diverse in a second on information dinteracting or diverse presented in diverse formatis and mean	SC.912.P.12.4:	Describe how the gravitational force between two objects depends on their masses and the distance between them.
 SC 972 P12 26. Calalitatives gaply the concept of angular momentum. SC 972 P12 27. Recorptore that hombing travels taster than the spaned of light invacuum which is the same cala diseavers no matter how they or the light sources are moving. SC 972 P12 38. Recorptore that involution travels taster than the spaned of light invacuum which is the same cala diseavers no matter how they or the light sources are moving. CPS 912 P12 49. Recorptore that involution travels taster than the spaned of light invacuum which is the same cala diseavers no matter how they or the light sources of light invocation to the frame of reference. CPS 912 P12 P12 49. CPS sequence that the local and cancer diseavers and light invacuum strengths concepts, processes, or information presented in a test by paraginaxing them is simple' build assure the same cancel query of diseavers and test by paraginaxing them is simple' build assure the test. CPS 1112 RET 14. Determine the meeting if disputs (sup terms, and other domain specific works and phrases as they are used in a specific societies relation to disa into categories or here archive, demonstrating understanding of the information or ideas. Advis 1112 RET 14. Advise the watter's grades in the test. Advise the watter's grades in the societies of information or ideas into categories or here archives domainstrating or the categories or here archives domainstrating or the societies. Advis 1112 RET 14. Advise the watter's grades in the societies of information or ideas into categories or here archives domainstrating of a processe, prenomenon in a societies categories. Advis 1112 RET 14. Advise the watter's grades in the societies of information description description description description description description. Advis 1112 RET 14.	SC.912.P.12.5:	Apply the law of conservation of linear momentum to interactions, such as collisions between objects.
SUG2 P1272 Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving. SUG2 P128. Recognize that Newton's Laws are a limiting calse of Ensider's Speedal Theory of Deathery at speeds that are much smaller than the speed of light. SUG2 P129. Recognize that Newton's Laws are a limiting calse of Ensider's Speedal Theory of Deathery at speeds that are much smaller than the speed of light. AFS 1112 RST.1.2 Determine the central ideas or conclusions of a text summarize complex concepts, processes, or information presented in a text by paraphrasing thom in drapite bat all accurate terms, and other domain-specific words and phrases as they are used in a specific scientific or technical cals. AFS 1112 RST.1.2 Determine the meaning of symbox, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical cals. AFS 1112 RST.2.6 Analyse the author's guades 11-12 texts and tapics. AFS 1112 RST.2.6 Analyse the author's guades 11-12 texts and tapics. AFS 1112 RST.2.6 Analyse the author's guades 11-12 texts and tapics. AFS 1112 RST.3.7 Thelefall multiple sources of information presented in deves formals and models (e.g., quantifiable data, video, multimedia) in order to address a quastion arsoles and process. AFS 1112 RST.3.8 Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verying the data when possible and cororoboratics.	SC.912.P.12.6:	Qualitatively apply the concept of angular momentum.
 St. 912.12.8. Becognize that Newton's Laws are a limiting case of Linssins' Special Theory of Relativity at specials that are much smaller than the special of light. SC. 912.P12.9. Becognize that These Internet and energy degret on the frame of reference. AFS 1112 EST 1.1. Or increasonated and energy degret on the frame of reference. AFS 1112 EST 1.2. Determine the central loss or orcholors of a text summarize complex concepts, processes, or information presented in a text by paraphrasing them in singlet built at accurate terms. AFS 1112 EST 1.3. Determine the central loss or orcholors of a text summarize complex concepts, processes, or information presented in a text by paraphrasing them in singlet built at accurate terms. AFS 1112 EST 1.3. Determine the central does or orcholors of a text summarize complex concepts, processes, or information presented in a text by paraphrasing them in singlet built at accurate terms. AFS 1112 EST 2.4. Analyze the meening of symbols. Key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context referent to grades 11-12 texts and topics. AFS 1112 EST 2.6. Analyze the author's purpose in providing an explanation, decreting a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. AFS 1112 EST 3.7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, videe, multimedia) in order to address a question crisoles parolels. AFS 1112 EST 3.8. Evaluate the hops theses, data, analysis, and conclusions in a science or technical text, writing the data when possible and corroborating or challenging on their diverse formation. AFS 1112 EST 3.1. AFS 1112 EST 3.1. AFS 1112 EST 3.1. Beulate the hops theses, data, analysis, and conclusions in a scienc	SC.912.P.12.7:	Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving.
25.912.P.12.9 Recognize that time, length, and energy depend on the farme of reference. A45.1112.BST.11 Chi be specific toxical in this account. A45.1112.BST.12. Determine the central ideos or conclusions of a text: summarize complex concepts, processes, or information presented in a text by paraphrasing them in single but still account. A45.1112.BST.12. Determine the meaning of symbols, key terms, and other domain specific works and phrases as they are used in a specific scentific or technical texts. A45.1112.BST.23. Determine the meaning of symbols, key terms, and other domain specific works and phrases as they are used in a specific scentific or technical context relevant to grades 11-12 texts and objects. A45.1112.BST.25. Analyze the author's purposed providing an explanation, describing a procedure, or discussing an explanation and text. A45.1112.BST.25. Analyze the author's purposed providing an explanation, describing a procedure, or discussing an explanation, describing a procedure, or discussing an explanation describing a procedure, or discussing an explanation describing a procedure, or discussing an explanation and text. A45.1112.BST.25. Analyze the author's purposed providing an explanation, describing a procedure, or discussing an explanation and text and describing a procedure, or discussing an explanation or ideas. A45.1112.BST.25. Analyze the author's purposed providing and conclusions in a science or technical text. Integrate and weakate multiple sources of information presented in diverse formasts and media (eg., quantitative data videa, multimedia	SC.912.P.12.8:	Recognize that Newton's Laws are a limiting case of Einstein's Special Theory of Relativity at speeds that are much smaller than the speed of light.
APS.1112.R5T.1.1: Offer sectif: textual evaluation to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps APS.1112.R5T.1.2: Determinine the cancel dises or conclusions of a text: summarize complex concepts, processes, or information presented in a text by paraphrasing APS.1112.R5T.1.2: Determinine the cancel dises or conclusions of a text: summarize complex concepts, processes, or information presented in a text by paraphrasing APS.1112.R5T.1.2: Determinine the meaning of syntols, key terms, and other domain specific scientific or itechnical texts: analyze the gapcific results based on explanations in the text. APS.1112.R5T.2.5: Analyze the author's purpose in providing an explanation, elasis ito catagories or hierarchise, demonstrating understanding of the information or ideas: tho catagories or hierarchise, demonstrating understanding of the information or ideas: the catagories or bierarchise, demonstrating understanding of the information or ideas: the catagories or bierarchise, demonstrating understanding of the information or ideas: the catagories or solve a problem. APS.1112.R5T.3.8: Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and comportent sciences of information. APS.1112.R5T.3.8: Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and comportent or solve a problem. APS.1112.R5T.3.1: By the end of grade 12; reace data comportent is cleased as tinterparts and meetia (adverify and process, phenomenon, or concept,	SC.912.P.12.9:	Recognize that time, length, and energy depend on the frame of reference.
AFS.1112.RST.12. Determine the central kloss or conclusions of a text summarize complex concepts processes, or information presented in a text by paraphrasing the insimpler but still accurate terms. AFS.1112.RST.13. Follow procisely a complex multiskep procedure when carrying out experiments. taking measurements, or performing technical tasks: analyze the specific results based on explanations in the toxt. AFS.1112.RST.2. Determine the maning of syntosis, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical tasks: analyze the author's purpose in providing an explanation of ideas into categories or hierarchies, demonstrating understanding of the information or ideas. AFS.1112.RST.2. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. AFS.1112.RST.3. Integrate and evaluate multiple sources of information presented in diverse formatis and media (e.g. quantitative data, wideo, multimoda) in order to address a guestion or solve approach, sing stress or information. AFS.1112.RST.3.9 Evaluate the hypothesis, diata analysis, and conclusions in a science or technical text, verifying the data when possible and components, or concept, resolving connicting information when possible concepts, test, and datases, building on other sources (g. 1, texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving connicting information when possible dives correlaw texts, and periassive information from a range of colloborative discussions and ther resources (g. 1, texts, or epresus, building on others sources (g. 1, texts,	LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
AFS 1112 RST.1.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks: analyze the specific results based on aspications in the text. AFS 1112 RST.2.4. Determine the meaning of symbols, key trens, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. AFS 1112 RST.2.5. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, iterrifying important issues that remain unresolved. AFS 1112 RST.3.7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. AFS 1112 RST.3.8. Evaluate the hypotheses, tata, analysis, and conclusions in a science or technical text, warifying the data when possible and corroborating or challenging conclusions with other sources (e.g., texts, spontiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. AFS 1112 RST.4.10. By the end of grade 12, respend, naving end and expendent duratir under science/resolutical texts in the grades 11–12 text complexity band independently, and proficently. Initiate and participate effectively in a range of collaborative discussions (on-em-one, in groups, and teacher-led) with diverse partners on grades 11–12 text complexity band independently. Initiate and participate effectively in a range of collaborative discussions and decision-remain.	LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LAPS 1112.RST.2.4: Determine the meaning of symbols, key terms, and other domain specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics. LAPS 1112.RST.2.5: Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that returne and unresolved. LAPS 1112.RST.2.6: Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that returne and unresolved. LAPS 1112.RST.3.7: Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. LAPS 1112.RST.3.8: Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, wrifying the data when possible and corroborating or challenging conclusions with other sources of information. LAPS 1112.RST.3.9: Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, wrifying the data when possible and corroborating or challenging conclusions when possible. LAPS 1112.RST.4 Dely the old grade 17_2 read and comprehendent science/technical texts in the grades 11-12 text complexity band independently and proficiently. Initiate and participate effectively in a range of collaborative discussions; (non-one, in groups, and teach-ed) with diverse partners on grades 11-12 text complexity draw on that preparation by referring to evidence from texts and other research on the	LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
 Context relevant to grade 11-12 cetts and togics. Context relevant togics and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. Context relevant to the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources (e.g., texts experiments, simulations) into a coherent understanding of a process, phenomeno, or concept, resolving conflicting information when possible. CarS 1112 RST 4.10: By the end of grade 12, read and comprehend science/technical texts in the grades 11-12 text complexity band independently and proficiently. Concept, resolving conflicting information when possible. CarS 1112 RST 4.10: By the end of grade 12, read and comprehend science/technical texts in the grades 11-12 text complexity band independently and proficiently. Corne to discussions prepared. harving end and researched material under study: explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of Ideas. Verk with peers to promote civil, democratic discussions and perconde tudy equiles prepared. harving and responding to questions that probe divergent and creative perspectives. Propel conversations by posing and responding to questions that probe reasoning and evidence ensure a hearing for a fault range of posillons on a topic or issue: clarify verify, or challenge ideas a	LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical
Drives 12:85 Analyze the lex Structures in moving an explanation, describing a procedure, or discussing an explanation describing a proceedure, or discussing an explanation, describing a proceedure, or discussing an explanation or challenging conclusions with other sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. AFS 1112.RST 3.8. Evaluate the hypothese, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. AFS 1112.RST 4.10. By the end of grade 12 read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently. Inliate and participate effectively in a range of sources (e.g., texts, experiments, simulational) and texteriled with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persussively. a Come to discussions prepared, having read and researched material under study exploitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoule during on a logic or issue; clarify, verify, or challengi eldeas and conclusions, and promote divergent and created enal susce resolve contradictions when possible: and determine what		Context relevant to grades 11–12 texts and topics.
LAFS 1112 RST 2.6. Analyse the auron's purpose in providing an expandition, descripting a proceedure, or discussing an experiment in a text, identifying important issues that remain unreached. LAFS 1112 RST 3.7: Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS 1112 RST 3.8: Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS 1112 RST 3.9: Synthesize information from a range of sources (e.g., text), experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS 1112 RST 4.10: By the end of grade 12 read and compresented technical texts in the grades 11–12 text complexity band independently and profilemly. Initiate and participate effectively in a range of collaborative discussions (ne on one, in groups, and teacher led) with diverse partners on grades 11–12 topics, texts, and issues, prepared, haring read and respectively and persussively. a. Come to discussions prepared, haring read and respective discussions (ne on one, in groups, and teacher led) with diverse partners on grades to respect the investing and exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision making, set clear goals and deadellines, and establish individual roles as uneeded. c. Propel conversations by posing and responding to questions that probe reasoning and evidence: ensure a hearing for a full range of positions on a topic or issue to information presented in diverse parameter and relative expresentives. d. Respond thoughtfully to diverse perspectives synthesize comments, claims, and evidence made on all sides of an issue: resolve contradictions when possible and determine what additional information devalence and onal sid	LAFS.1112.RS1.2.5:	Analyze now the text structures information or ideas into categories or nierarchies, demonstrating understanding of the information or ideas.
LAFS.1112.RST.3.7: Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a quasition or solve a problem. LAFS.1112.RST.3.8: Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8: Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8: Evaluate the hypotheses, data, analysis, and conclusions (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conclusions when possible. LAFS.1112.RST.3.9: Evaluate the hypotheses, data, analysis, and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently. LAFS.1112.RST.3.9: Come to discussions prepared, having read and researched material under study, explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, explicitly call draws and exclusions and eclesion making, set clear goals and declines; and establish individual roles as needed. LAFS.1112.SL.1.1: Come to discussions paperate, having read text discussions, and romote divergent and creative perspectives. LAFS.1112.SL.1.2: Integrate multiple sources of information presented in diverse formats and med	LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain upresolved
 LAFS.1112.RST.3.8: Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8: Setting the data when possible and corroborating or concept, resolving conflicting information when possible. LAFS.1112.RST.4.10: By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently. Initiate and participate effectively in a range of collaborative discussions (one on one, in groups, and teach-reled) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study: explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence: ensure a hearing for a full range of positions on a topic or issue: clarify, verify, or challenge ideas and conclusions: and promote divergent and creative perspectives. LAFS.1112.SL.1.2: Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discepancies among the data. LAFS.1112.SL.1.3: Evaluate a speaker's point of view, reasoning, and use of evidence, and ration or possible, and determine weareadoring or findings, reasoning, and supporting evidence, co	LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.4.10: By the end of grade 12, read and comprehend science/technical texts in the grades 11-12 text complexity band independently and proficiently. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11-12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study: explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence: ensure a hearing for a full range of positions on a topic or issue: clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives synthesize comments, claims, and evidence made on all sides of an issue: resolve contradictons when possible: and oble problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. LAFS.1112.SL.1.3: Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and store proposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose	LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
 LAFS.1112.RST.4.10: By the end of grade 12, read and comprehend science/technical texts in the grades 11-12 text complexity band independently and proficiently. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11-12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence: ensure a hearing for a full range of positions on a topic or issue: clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives: synthesize comments, claims, and evidence made on all isides of an issue: resolve contradictions when possible: and determine what additional information or research is required to deepen the investigation or complete the task. LAFS.1112.SL.1.2: Integrate multiple sources of information presented in diverse formatis and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. LAFS.1112.SL.1.3: Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used. Present information, findings, and supporting evidence, conveying a clear	LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible
 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11-12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence: ensure a hearing for a full range of positions on a topic or issue: clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives: synthesize comments, claims, and evidence: made on all sides of an issue: resolve contradictions when possible: and determine what additional information or research is required to deepen the investigation or complete the task. LAFS 1112.SL 1.2: Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of acch source and noting any discrepancies among the data. LAFS 1112.SL 1.3: Evaluate a speaker's point of view, reasoning, and use of evidence: assessing the stance, premises, links among ideas, word choice, points of emphasis, and to used. Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning and range of formal and informal tasks. LAFS 1112.SL 2.5: Make strategic use of digit	LAES 1112 DST / 10-	By the and of grade 12, read and comprehend science/technical texts in the grades 11, 12 text complexity hand independently and profisiontly
 LAFS.1112.SL.1.1: needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence: ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions: and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives: synthesize comments, claims, and evidence: ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions: and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives: synthesize comments, claims, and evidence: made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task. LAFS.1112.SL.1.2: Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. LAFS.1112.SL.1.3: Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used. Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning and arange of formal and informal tasks. LAFS.1112.SL.2.5: Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) f		 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as
d. Respond thoughtfully to diverse perspectives: synthesize comments, claims, and evidence made on all sides of an issue: resolve contradictions when possible: and determine what additional information or research is required to deepen the investigation or complete the task. LAFS.1112.SL.1.2: Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. LAFS.1112.SL.1.3: Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used. LAFS.1112.SL.2.4: Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks. LAFS.1112.SL.2.5: Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. Wirite arguments focused on discipline-specific content. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. LAFS.1112.WHST.1.1: concerns, values, and locounterclaims f	LAF5.1112.5L.1.1:	needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.
LAFS.1112.SL.1.2: Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. LAFS.1112.SL.1.3: Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used. LAFS.1112.SL.2.4: Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning and a range of formal and informal tasks. LAFS.1112.SL.2.5: Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. Write arguments focused on <i>discipline-specific content</i> . a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. LAFS.1112.WHST.1.1: b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relati		d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.3: Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used. LAFS.1112.SL.2.4: Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning and a range of formal and informal tasks. LAFS.1112.SL.2.4: alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks. LAFS.1112.SL.2.5: Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. Write arguments focused on <i>discipline-specific content</i> . a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and counterclaims	LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.2.4: Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks. LAFS.1112.SL.2.5: Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. Write arguments focused on <i>discipline-specific content</i> . a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons between reasons and evidence and between claim(s) and counterclaims	LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.5: Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. Write arguments focused on <i>discipline-specific content</i> . a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and counterclaims	LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons between reasons and evidence claim(s) and counterclaims. 	LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
שבושכבו כומווזנטן מות רבמסטוס, שבושפנו רפמסטוס מות פיותפורב, מות שבושפנו כומווזנט) מות נסטוונפו כומווזנט.	LAFS.1112.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

	 d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
LAFS.1112.WHST.2.6:	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.1112.WHST.3.8:	limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of
LAFS.1112.WHST.4.10:	discipline-specific tasks, purposes, and audiences.
LAFS.910.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to
LAFS.910.RST.1.3:	special cases or exceptions defined in the text.
LAFS.910.RST.3.7:	Iranslate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.WHST.1.2:	 a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
MAFS.912.A-CED.1.4:	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R. \star
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. \star
MAFS.912.F-IF.3.7:	 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.G-GMD.1.3:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. *
MAES 012 N O 1 1	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). * Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas;
MAFS 912 N O 1 2	choose and interpret the scale and the origin in graphs and data displays. *
MAES 912 NLVM 1 1	Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate
MAES 012 NI VM 1 2	symbols for vectors and their magnitudes (e.g., v , $ v $, $ v $, v). Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.
MAFS.912.N-VM.1.3:	Solve problems involving velocity and other quantities that can be represented by vectors.
MAFS.912.S-IC.2.6:	Evaluate reports based on data. *
	Represent data with piots on the real number line (dot piots, histograms, and box piots). 🗙

MAFS.912.S-ID.1.1:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.	
	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard	
MAFS.912.S-ID.1.2:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.	
MAFS.912.S-ID.1.3:	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.	
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. \star	
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joi marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. ★	
MAFS.912.S-ID.2.6:	 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association. 	
	Clarifications: Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.	
MAFS.K12.MP.1.1:	Make sense of problems and persevere in solving them. Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.	
	Reason abstractly and quantitatively.	
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.	
	Construct viable arguments and critique the reasoning of others.	
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.	
	Model with mathematics.	
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.	
	Use appropriate tools strategically.	
	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software	

MAFS.K12.MP.5.1:	Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.

General Course Information and Notes

GENERAL NOTES

While the content focus of this course is consistent with the Physics 1 course, students will explore these concepts in greater depth as preparatory work for the IB Physics course(s). In general, the academic pace and rigor will be greatly increased for pre-IB level coursework. Coursework should include opportunities for students to develop their understanding of both theory and experiments, developing traditional practical skills and techniques while also developing interpersonal and digital communication skills in preparation for the IB Physics course.

Integral to the experience of students in Pre-IB Physics courses is their experience in the classroom laboratory or in the field. Practical activities allow students to interact directly with natural phenomena and secondary data sources. These experiences provide the students with the opportunity to design investigations, collect data, develop manipulative skills, analyze results, collaborate with peers and evaluate and communicate their findings. Experiments can be used to introduce a topic, investigate a phenomenon or allow students to consider and examine questions and curiosities. These laboratory experiences are essential as preparatory work for the IB Physics course(s).

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routing basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures,

and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and a

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

Course Standards

Appropriate grade levels standards in Language Arts should be used for students in Grades 9-10 and Grades 11-12.

GENERAL INFORMATION	
Course Number: 2003836	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject:
	Abbreviated Title: FL PRE-IB PHYSICS 1
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
Course Type: Core Academic Course Course Level: 3	
Course Status: Course Approved	
Grade Level(s): 9,10	
Graduation Requirement: Equally Rigorous Science	2

Educator Certifications

Physics (Grades 6-12)

Florida's Preinternational Baccalaureate Physics 1 (#2003836) 2022 - And Beyond

Course Standards

Name	Description
SC.912.E.5.2:	Identify patterns in the organization and distribution of matter in the universe and the forces that determine them.
SC.912.E.5.6:	Develop logical connections through physical principles, including Kepler's and Newton's Laws about the relationships and the effects of Earth, Moon, and Sun on each other.
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.
SC 0121 18 12	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate
36.712.L.10.12.	temperature, expansion upon freezing, and versatility as a solvent.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:
	1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and it not, modily of develop new models).
SC.912.N.1.1:	 Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	appendix on the second se
	organized way. Properly use instruments equipment and materials (e.g. scales proheware meter sticks microscopes computers) including
	set-un calibration technique maintenance and storage)
	7 Pose answers, explanations, or descriptions of events.
	8. Generate explanations that explicate or describe natural phenomena (inferences).
	9. Use appropriate evidence and reasoning to justify these explanations to others.
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe now scientific interences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.2:	identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC 912 N 2 3	Identify examples of pseudoscience (such as astrology, phrenology) in society
00.712.11.2.0.	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and
SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger,
	leading to its durability.
	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they
SC.912.N.2.5:	make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as
	they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial
SC 012 N 2 2	Tange of phenomena; mus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.IN.3.2:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those
SC.912.N.3.3:	relationships
	Recognize that theories do not become laws, nor do laws become theories: theories are well supported explanations and laws are well supported
SC.912.N.3.4:	descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.P.8.1:	Differentiate among the four states of matter.
CC 012 D 0 2	Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes
SC.912.P.8.3:	were necessitated by experimental evidence.
SC 912 P 8 4	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons,
30.712.1.0.4.	and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.
SC.912.P.10.3:	Compare and contrast work and power qualitatively and quantitatively.
SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter
SC 912 P 10 5	Relate temperature to the average molecular kinetic energy
30.712.1.10.3.	Notate temperature to the average molecular kinetic energy.

SC.912.P.10.6:	Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum.	
SC.912.P.10.7:	Distinguish between endothermic and exothermic chemical processes.	
SC.912.P.10.8:	Explain entropy's role in determining the efficiency of processes that convert energy to work	
SC 912 P 10 10	Compare the magnitude and range of the four fundamental forces (gravitational electromagnetic weak nuclear strong nuclear)	
SC 912 P 10 13	Polate the configuration of static charges to the electric field electric force electric potential and electric notential energy.	
SC 012 P 10 14	Differentiate among conductors, semiconductors, and insulators	
SC 012 D 10 15	Dimerentiate anony conductors, semiconductors, and instantors.	
SC 912 P 10 16	Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and electric fields, and their application to	
SC 912 P 10 17	modern technologies. Evolore the theory of electromagnetism by evolution electromagnetic wayes in terms of oscillating electric and magnetic fields	
SC 012 D 10 19	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength,	
30.912.F.10.16.	frequency, and energy, and relate them to phenomena and applications.	
SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and now these properties change when the wave moves from one medium to another.	
SC.912.P.10.21:	Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.	
SC.912.P.10.22:	Construct ray diagrams and use thin lens and mirror equations to locate the images formed by lenses and mirrors.	
SC.912.P.12.1:	Distinguish between scalar and vector quantities and assess which should be used to describe an event.	
SC.912.P.12.2:	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.	
SC.912.P.12.3:	Interpret and apply Newton's three laws of motion.	
SC.912.P.12.4:	Describe how the gravitational force between two objects depends on their masses and the distance between them.	
SC.912.P.12.5:	Apply the law of conservation of linear momentum to interactions, such as collisions between objects.	
SC.912.P.12.6:	Qualitatively apply the concept of angular momentum.	
SC.912.P.12.7:	Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving.	
SC.912.P.12.8:	Recognize that Newton's Laws are a limiting case of Einstein's Special Theory of Relativity at speeds that are much smaller than the speed of light.	
SC.912.P.12.9:	Recognize that time, length, and energy depend on the frame of reference.	
	Mathematicians who narticinate in effortful learning both individually and with others:	
	Analyze the problem in a way that makes sense given the task	
	Analyze the problem in a way that makes sense given the task.	
	 Ask questions that will help with solving the task. 	
	Build perseverance by modifying methods as needed while solving a challenging task.	
	Stay engaged and maintain a positive mindset when working to solve tasks.	
	Help and support each other when attempting a new method or approach.	
IVIA.K 12.IVITR. 1. 1:	Clarifications:	
	Teachers who encourage students to participate actively in effortful learning both individually and with others:	
	Cultivate a community of growth mindset learners.	
	Foster perseverance in students by choosing tasks that are challenging.	
	Develop students' ability to analyze and problem solve.	
	Recognize students' effort when solving challenging problems.	
	Demonstrate understanding by representing problems in multiple ways.	
	Mathematicians who demonstrate understanding by representing problems in multiple ways:	
	Build understanding through modeling and using manipulatives.	
	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. 	
	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Brogress from modeling problems with objects and drawings to using algorithms and equations. 	
	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concents and connectations. 	
	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. 	
MA.K12.MTR.2.1:	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. 	
MA.K12.MTR.2.1:	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. 	
MA.K12.MTR.2.1:	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:	
MA.K12.MTR.2.1:	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. 	
MA.K12.MTR.2.1:	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. 	
MA.K12.MTR.2.1:	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. 	
MA.K12.MTR.2.1:	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.	
MA.K12.MTR.2.1:	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.	
MA.K12.MTR.2.1:	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations. 	
MA.K12.MTR.2.1:	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations. Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:	
MA.K12.MTR.2.1:	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations. Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context.	
MA.K12.MTR.2.1:	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations. Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. 	
MA.K12.MTR.2.1:	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations. Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. 	
MA.K12.MTR.2.1:	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations. Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. 	
MA.K12.MTR.2.1: MA.K12.MTR.3.1:	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations. Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. 	
MA.K12.MTR.2.1: MA.K12.MTR.3.1:	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations. Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. 	
MA.K12.MTR.2.1: MA.K12.MTR.3.1:	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations. Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. 	
MA.K12.MTR.2.1: MA.K12.MTR.3.1:	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations. Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. 	
MA.K12.MTR.2.1: MA.K12.MTR.3.1:	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations. Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods 	
MA.K12.MTR.2.1: MA.K12.MTR.3.1:	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations. Complete tasks with mathematical fluency: Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide st	
MA.K12.MTR.2.1:	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations. Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Mainin flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used. 	
MA.K12.MTR.2.1:	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations. Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient method could	
MA.K12.MTR.2.1:	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations. Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to reflect on the method they used and determine if a more efficient m	
MA.K12.MTR.2.1:	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations. Complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used. Engage in discussions that reflect on the mathematical thinking of self and others. Mathematician swho engage in discussions that reflect on the mathematical thinking of self a	

MA.K12.MTR.4.1:	 Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes.
	 Construct possible arguments based on evidence. Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts.
MA.K12.MTR.5.1:	 Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations.
	 Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used.
	 Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
	 Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	 σ-σ students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.

ELA.K12.EE.3.1:	Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.

General Course Information and Notes

GENERAL NOTES

While the content focus of this course is consistent with the Physics 1 course, students will explore these concepts in greater depth as preparatory work for the IB Physics course(s). In general, the academic pace and rigor will be greatly increased for pre-IB level coursework. Coursework should include opportunities for students to develop their understanding of both theory and experiments, developing traditional practical skills and techniques while also developing interpersonal and digital communication skills in preparation for the IB Physics course.

Integral to the experience of students in Pre-IB Physics courses is their experience in the classroom laboratory or in the field. Practical activities allow students to interact directly with natural phenomena and secondary data sources. These experiences provide the students with the opportunity to design investigations, collect data, develop manipulative skills, analyze results, collaborate with peers and evaluate and communicate their findings. Experiments can be used to introduce a topic, investigate a phenomenon or allow students to consider and examine questions and curiosities. These laboratory experiences are essential as preparatory work for the IB Physics course(s).

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routing basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- · Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards:

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and

concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf.

Course Standards

Appropriate grade levels standards in Language Arts should be used for students in Grades 9-10 and Grades 11-12.

GENERAL INFORMATION

	Course Path: Section: Grades PreK to 12 Education
Course Number: 2002826	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number. 2003830	Education Courses > Subject: Science > SubSubject:
	Physical Sciences >
	Abbreviated Title: FL PRE-IB PHYSICS 1
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
Course Type: Core Academic Course	Course Level: 3
Course Status: State Board Approved	
Grade Level(s): 9,10	
Graduation Requirement: Equally Rigorous Science	

Educator Certifications

Physics (Grades 6-12)

International Baccalaureate Physics 1 (#2003840) 2014-

And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at: http://www.ibo.org/en/programmes/

GENERAL INFORMATION

Course Number: 2003840

Number of Credits: One (1) credit

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Physical Sciences > Abbreviated Title: IB PHYSICS 1 Course Length: Year (Y) Course Attributes: • International Baccalaureate (IB) Course Level: 3

Educator Certifications

Science (Secondary Grades 7-12) Physics (Grades 6-12)

International Baccalaureate Physics 2 (#2003845) 2014-

And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

Course Number: 2003845

Number of Credits: One (1) credit

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Physical Sciences > Abbreviated Title: IB PHYSICS 2 Course Length: Year (Y) Course Attributes: • International Baccalaureate (IB) Course Level: 3

Science (Secondary Grades 7-12)	
Physics (Grades 6-12)	

International Baccalaureate Physics 3 (#2003850) 2014-

And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

Course Number: 2003850

Number of Credits: One (1) credit

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Physical Sciences > Abbreviated Title: IB PHYSICS 3 Course Length: Year (Y) Course Attributes: • International Baccalaureate (IB) Course Level: 3

Science (Secondary Grades 7-12)	
Physics (Grades 6-12)	

International Baccalaureate MYP Physics (#2003855) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

Course Number: 2003855	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Physical Sciences >
	Abbreviated Title: IB MYP PHYSICS
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	International Baccalaureate (IB)
Course Type: Core Academic Course	Course Level: 3
Course Status: Course Approved	
Graduation Requirement: Equally Rigorous Science	

Science (Secondary Grades 7-12)	
Physics (Grades 6-12)	

International Baccalaureate Design Technology (#2003860) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course: Any academic coverage (any coverage classified as an academic coverage in Rules 6A-4.0101 through 6A-4.0343, Florida Administrative Code).

GENERAL INFORMATION

Course Number: 2003860

Number of Credits: One (1) credit

Course Type: Elective Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Physical Sciences > Abbreviated Title: IB DESIGN TECH 1 Course Length: Year (Y) Course Attributes: • International Baccalaureate (IB) Course Level: 3

International Baccalaureate Design Technology 2 (#2003862) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course: Any academic coverage (any coverage classified as an academic coverage in Rules 6A-4.0101 through 6A-4.0343, Florida Administrative Code).

GENERAL INFORMATION

Course Number: 2003862

Number of Credits: One (1) credit

Course Type: Elective Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Physical Sciences > Abbreviated Title: IB DESIGN TECH 2 Course Length: Year (Y) Course Attributes: • International Baccalaureate (IB) Course Level: 3

International Baccalaureate Design Technology 3 (#2003864) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course: Any academic coverage (any coverage classified as an academic coverage in Rules 6A-4.0101 through 6A-4.0343, Florida Administrative Code).

GENERAL INFORMATION

Course Number: 2003864

Number of Credits: One (1) credit

Course Type: Elective Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Physical Sciences > Abbreviated Title: IB DESIGN TECH 3 Course Length: Year (Y) Course Attributes: • International Baccalaureate (IB) Course Level: 3

Nuclear Radiation Honors (#2020710) 2015 - 2022 (current)

Course Standards

Name	Description
SC.912.E.5.1:	Cite evidence used to develop and verify the scientific theory of the Big Bang (also known as the Big Bang Theory) of the origin of the universe.
SC.912.E.5.2:	Identify patterns in the organization and distribution of matter in the universe and the forces that determine them.
SC.912.E.5.3:	Describe and predict how the initial mass of a star determines its evolution.
SC.912.E.5.4:	Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth.
SC.912.E.5.7:	Relate the history of and explain the justification for future space exploration and continuing technology development.
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.
SC.912.E.6.6:	Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies.
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.15.2:	Discuss the use of molecular clocks to estimate how long ago various groups of organisms diverged evolutionarily from one another.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.14:	Assess the need for adequate waste management strategies.
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.
	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone
SC.912.L.17.16:	depletion, and surface and groundwater pollution.
SC.912.L.17.17:	Assess the effectiveness of innovative methods of protecting the environment.
	Define a problem based on a specific body of knowledge, for example; biology, chemistry, physics, and earth/space science, and do the following;
	1. Pose guestions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable, Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations:
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3 Examine books and other sources of information to see what is already known.
	4. Review what is known in light of empirical evidence. (Examine whether available empirical evidence can be interpreted in terms of
	evicting knowledge and models, and if not modify or develop new models)
	5. Plan investigations (Design and evaluate a scientific investigation)
SC.912.N.1.1:	 Har investigations, (besign and evaluate a solution investigation). I is a tools to gather analyze and interpret data (this includes the use of measurement in matric and other systems, and also the
	o. Use tools to gather, analyze, and interpret data (this includes the use of measurement in method and other systems, and also the
	organized way. Drenerly use instruments equipment and materials (e.g., scales, probeware, materialis, (collect data of evidence in an
	organized way. Property use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	7 Dece answers, explanations, er deceriptions of events
	7. Pose answers, explanations, or descriptions or events,
	 Generate explanations that explicate or describe natural phenomena (interferces), Use expressive suideness and respective to institution the set of the respective set of th
	9. Ose appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	The Evaluate the ments of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC 912 N 1 3	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical
36.712.14.1.3.	thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.
	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and
SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger,
	leading to its durability.
	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they
SC.912.N.2.5:	make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as
	they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
CC 012 N 2 1	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial
3C.412.IV.3.1:	range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.

SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as
	human, economic, and environmental.
SC.912.P.8.3:	Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes were necessitated by experimental evidence.
SC.912.P.8.4:	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC.912.P.8.5:	Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.
SC.912.P.10.8:	Explain entropy's role in determining the efficiency of processes that convert energy to work.
SC.912.P.10.9:	Describe the quantization of energy at the atomic level.
SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).
SC.912.P.10.11:	Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues.
SC.912.P.10.12:	Differentiate between chemical and nuclear reactions.
SC.912.P.10.16:	Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and electric fields, and their application to modern technologies.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.12.5:	Apply the law of conservation of linear momentum to interactions, such as collisions between objects.
SC.912.P.12.7:	Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving.
SC.912.P.12.9:	Recognize that time, length, and energy depend on the frame of reference.
LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics.
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues
LAFS.1112.RS1.2.6:	that remain unresolved.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LAFS.1112.RST.4.10:	By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.
	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence
	from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.
LAFS.1112.SL.1.1:	b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed.
	c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on
	a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.
	d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and evelopment, substance, and style are appropriate to purpose, audience, and evelopment are addressed and the organization development.
LAFS.1112.SL.2.5:	and a range of formal and informal tasks. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of
LAFS.1112.WHST.1.1:	 Write arguments focused on <i>discipline-specific content</i>. a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establich and maintain a formal study and objective to one while attending to the parms and conventions of the discipling in which they are writing.

	e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.1.2:	 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.2.5:	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, tocusing on addressing what is most significant for a specific purpose and audience.
LAFS.1112.WHST.2.6:	including new arguments or information.
LAFS.1112.WHST.3.7:	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LAFS.1112.WHST.3.8:	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.1112.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i> \bigstar
MAFS.912.F-IF.3.7:	 a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.G-MG.1.2:	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star
MAFS.912.S-IC.2.6:	Evaluate reports based on data. ★
MAFS.912.S-ID.1.1:	Represent data with plots on the real number line (dot plots, histograms, and box plots). * Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.2:	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ★ Clarifications:
	In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.3:	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. \star
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. \star
MAFS.912.S-ID.2.6:	 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association.
	Clarifications: Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.

1	
	Make sense of problems and persevere in solving them.
MAFS.K12.MP.1.1:	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting
MAFS.K12.MP.2.1:	Reason abstractly and quantitatively. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting
MAFS.K12.MP.3.1:	Construct viable arguments and critique the reasoning of others. Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting
MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Standard Relation to Course: Supporting Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
MAFS.K12.MP.6.1:	Attend to precision. Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting Look for and make use of structure.
MAFS.K12.MP.7.1:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and $y = 0$.

	Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

GENERAL NOTES

While the content focus of this course is consistent with the Nuclear Radiation course, students will explore these concepts in greater depth. In general, the academic pace and rigor will be greatly increased for honors level course work. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

Course Number: 2020710

Number of Credits: One (1) credit

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult

Education Courses > Subject: Science > SubSubject:

Physical Sciences >

Course Level: 3

Course Length: Year (Y) Course Attributes: • Honors

Abbreviated Title: NUC RADI HON

Educator Certifications

Science (Secondary Grades 7-12) Chemistry (Grades 6-12) Physics (Grades 6-12) Middle Grades General Science (Middle Grades 5-9) Earth/Space Science (Grades 6-12) Biology (Grades 6-12)

Nuclear Radiation Honors (#2020710) 2022 - And Beyond

Course Standards

Name	Description
SC.912.E.5.1:	Cite evidence used to develop and verify the scientific theory of the Big Bang (also known as the Big Bang Theory) of the origin of the universe.
SC.912.E.5.2:	Identify patterns in the organization and distribution of matter in the universe and the forces that determine them.
SC.912.E.5.3:	Describe and predict how the initial mass of a star determines its evolution.
SC.912.E.5.4:	Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth.
SC.912.E.5.7:	Relate the history of and explain the justification for future space exploration and continuing technology development.
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.
SC.912.E.6.6:	Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies.
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.15.2:	Discuss the use of molecular clocks to estimate how long ago various groups of organisms diverged evolutionarily from one another.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.14:	Assess the need for adequate waste management strategies.
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.
	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone
SC.912.L.17.16:	depletion, and surface and groundwater pollution.
SC.912.L.17.17:	Assess the effectiveness of innovative methods of protecting the environment.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:
	1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
	5. Plan investigations, (Design and evaluate a scientific investigation).
SC.912.N.1.1:	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	set-up, calibration, technique, maintenance, and storage).
	7. Pose answers, explanations, or descriptions of events.
	8. Generate explanations that explicate or describe natural phenomena (inferences).
	9. Use appropriate evidence and reasoning to justify these explanations to others.
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
CO 010 N 1 0	
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength of userulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thicking, and the active concidenation of alternative scientific evaluations to evaluate the data presented.
SC 012 N 1 4	Initiating, and the active consideration or alternative scientific explanations to explain the data presented.
SC.912.N.1.4.	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.5.	Describe and provide examples of now similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.0.	Describe now scientific fillerences are drawn norm scientific questions, and provide examples norm the content being studied.
SC.912.N.1.7.	Recognize the role of creativity in constructing scientific questions, methods and explanations.
30.912.10.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but rails to meet the criteria for science).
SC.912.N.2.2:	identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as
SC 012 N 2 2	destions addressed by other ways of knowing, such as art, philosophy, and rengion.
30.912.11.2.3.	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and
SC 912 N 2 4	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger
30.712.14.2.4.	leading to its durability
	Describe instances in which scientists' varied backgrounds talents interests and goals influence the inferences and thus the explanations that they
SC.912.N.2.5:	make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as
	they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial
SC.912.N.3.1:	range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC 012 N 2 2	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those
30.912.11.3.3:	relationships.
SC 012 N 2 4	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported
36.712.11.3.4:	descriptions.

SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.8.3:	Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes were necessitated by experimental evidence.
SC.912.P.8.4:	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC.912.P.8.5:	Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.
SC.912.P.10.8:	Explain entropy's role in determining the efficiency of processes that convert energy to work.
SC.912.P.10.9:	Describe the quantization of energy at the atomic level.
SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).
SC.912.P.10.11:	Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues.
SC.912.P.10.12:	Differentiate between chemical and nuclear reactions.
SC.912.P.10.16:	Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and electric fields, and their application to modern technologies.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.12.5:	Apply the law of conservation of linear momentum to interactions, such as collisions between objects.
SC.912.P.12.7:	Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving.
SC.912.P.12.9:	Recognize that time, length, and energy depend on the frame of reference.
	Mathematicians who participate in effortful learning both individually and with others:
	Analyze the problem in a way that makes sense given the task. Ask questions that will below it have task.
	 Build perseverance by modifying methods as needed while solving a challenging task.
	 Stay engaged and maintain a positive mindset when working to solve tasks.
	Help and support each other when attempting a new method or approach.
MA.K12.MTR.1.1:	Clarifications:
	Teachers who encourage students to participate actively in effortful learning both individually and with others:
	Cultivate a community of growth mindset learners.
	Foster perseverance in students by choosing tasks that are challenging.
	 Develop students' ability to analyze and problem solve. Decognize students' effort when solving shallonging problems.
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:
	Build understanding through modeling and using manipulatives.
	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
	 Progress from modeling problems with objects and drawings to using algorithms and equations.
	Express connections between concepts and representations.
MA.K12.MTR.2.1:	Choose a representation based on the given context or purpose.
	Clarifications:
	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:
	 Help students make connections between concepts and representations. Dravide opportunities for students to use manipulatives when investigating concepts
	 Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to nictorial to abstract representations as understanding progresses.
	 Show students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency.
	Mathematicians who complete tasks with mathematical fluency:
	Select efficient and appropriate methods for solving problems within the given context.
	Maintain flexibility and accuracy while performing procedures and mental calculations.
	Complete tasks accurately and with confidence.
MA.K12.MTR.3.1:	Adapt procedures to apply them to a new context.
WMART2.WTTA.S.T.	Use reedback to improve efficiency when performing calculations.
	Clarifications:
	 Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
	Offer multiple opportunities for students to practice efficient and generalizable methods.
	• Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others.
	Communicate mathematical ideas, vocabulary and methods effectively
	 Analyze the mathematical thinking of others.
	Compare the efficiency of a method to those expressed by others.
	Recognize errors and suggest how to correctly solve the task.

MA.K12.MTR.4.1:	 Justify results by explaining methods and processes. Construct possible arguments based on evidence
	 Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
MA.K12.MTR.5.1:	 Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations.
	 Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context.
	 Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
	 Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
MA.K12.MTR.7.1:	 Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
	 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the

	girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.	
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.	
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.	
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work.	
	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.	
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing.	
	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.	
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.	
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.	

General Course Information and Notes

GENERAL NOTES

While the content focus of this course is consistent with the Nuclear Radiation course, students will explore these concepts in greater depth. In general, the academic pace and rigor will be greatly increased for honors level course work. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students

will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades Prek to 12 Education
Course Number: 2020710	Courses > Grade Group: Grades 9 to 12 and Adult
course Number: 2020/10	Education Courses > Subject: Science > SubSubject:
	Physical Sciences >
	Abbreviated Title: NUC RADI HON
Number of Credits: One (1) credit	Course Length: Year (Y)
	Course Attributes:
	Honors
Course Type: Core Academic Course	Course Level: 3
Course Status: State Board Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Equally Rigorous Science	

Science (Secondary Grades 7-12)	
Chemistry (Grades 6-12)	
Physics (Grades 6-12)	
Aiddle Grades General Science (Middle Grades 5-9)	
arth/Space Science (Grades 6-12)	
Biology (Grades 6-12)	
Astronomy Solar/Galactic Honors (#2020910) 2015 - 2022 (current)

Name	Description
SC.912.E.5.7:	Relate the history of and explain the justification for future space exploration and continuing technology development.
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.
SC.912.E.5.9:	Analyze the broad effects of space exploration on the economy and culture of Florida.
SC.912.E.5.10:	Describe and apply the coordinate system used to locate objects in the sky.
SC.912.E.5.11:	Distinguish the various methods of measuring astronomical distances and apply each in appropriate situations.
SC.912.E.6.2:	Connect surface features to surface processes that are responsible for their formation.
SC.912.E.7.7:	Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:
	1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
CO 010 N 1 1	5. Plan investigations, (Design and evaluate a scientific investigation).
SC.912.N.1.1:	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	set-up, calibration, technique, maintenance, and storage).
	7. Pose answers, explanations, or descriptions of events,
	8. Generate explanations that explicate or describe natural phenomena (inferences),
	9. Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC 912 N 1 3	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical
56.712.10.1.5.	thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as
SC 012 N 2 2	questions addressed by other ways of knowing, such as act, prinosophy, and religion.
36.712.14.2.3.	Evaluation for the scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and
SC 912 N 2 4	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger
0017121112111	leading to its durability.
	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they
SC.912.N.2.5:	make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as
	they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC 912 N 3 1	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial
56.712.14.5.1.	range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those
	relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported
CC 012 N 2 F.	descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
30.912.11.4.1.	Explain now scientific knowledge and reasoning provide an empirically-based perspective to innorm society's decision making.
SC.912.N.4.2:	buman economic and environmental
SC.912.P.8.1:	Differentiate among the four states of matter.
	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrops and electrops
SC.912.P.8.4:	and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or
SC.912.P.10.4:	states of matter.
SC.912.P.10.9:	Describe the quantization of energy at the atomic level.

SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).
SC.912.P.10.11:	Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.10.19:	Explain that all objects emit and absorb electromagnetic radiation and distinguish between objects that are blackbody radiators and those that are not.
SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.
SC.912.P.10.21:	Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.
SC.912.P.10.22:	Construct ray diagrams and use thin lens and mirror equations to locate the images formed by lenses and mirrors.
SC.912.P.12.2:	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.
SC.912.P.12.3:	Interpret and apply Newton's three laws of motion.
SC.912.P.12.4:	Describe how the gravitational force between two objects depends on their masses and the distance between them.
SC.912.P.12.0.	Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving
SC 912 P 12 8 [.]	Recognize that Newton's Laws are a limiting case of Einstein's Special Theory of Relativity at speeds that are much smaller than the speed of light
SC.912.P.12.9:	Recognize that the length, and energy depend on the frame of reference.
LAFS.1112.RST.1.1:	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
LAFS.1112.RST.1.2:	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
LAFS.1112.RST.2.5:	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LAFS.1112.RST.2.6:	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.RST.3.8:	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LAFS.1112.RST.3.9:	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LAFS 1110 DST / 10.	
LAF3.1112.K31.4.10.	By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades
LAFS.1112.R51.4.10.	 By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.1: LAFS.1112.SL.1.1: LAFS.1112.SL.1.2:	 By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.1: LAFS.1112.SL.1.1: LAFS.1112.SL.1.2:	 By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice,
LAFS.1112.SL.1.1: LAFS.1112.SL.1.1: LAFS.1112.SL.1.2: LAFS.1112.SL.1.3:	 By the end of grade 12, read and comprehend science/technical texts in the grades 11-12 text complexity band independently and proficiently. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11-12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.1.1: LAFS.1112.SL.1.1: LAFS.1112.SL.1.2: LAFS.1112.SL.1.3: LAFS.1112.SL.2.4:	 By the end of grade 12, read and comprehend science/technical texts in the grades 11-12 text complexity band independently and proficiently. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11-12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study, explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used. Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning,
LAFS.1112.SL.1.1: LAFS.1112.SL.1.1: LAFS.1112.SL.1.2: LAFS.1112.SL.1.3: LAFS.1112.SL.2.4: LAFS.1112.SL.2.5:	 By the end of grade 12, read and comprehend science/technical texts in the grades 11-12 text complexity band independently and proficiently. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11-12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study: explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used. Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning,
LAFS.1112.SL.1.1: LAFS.1112.SL.1.1: LAFS.1112.SL.1.2: LAFS.1112.SL.2.4: LAFS.1112.SL.2.4: LAFS.1112.SL.2.5:	 By the end of grade 12, read and comprehend science/technical texts in the grades 11-12 text complexity band independently and proficiently. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11-12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. Come to discussions prepared, having read and researched material under study, explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughful, well-reasoned exchange of ideas. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. Propel conversations by posing and responding to questions that probe reasoning and evidence: ensure a hearing for a full range of positions on a topic or issue: clarify, verify, or challenge ideas and conclusions: and promote divergent and creative perspectives. Respond thoughfully to diverse perspectives: synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used. Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alter

LAFS.1112.WHST.1.2:	 information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
LAFS 1112 WHST 2.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience
	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most
LAFS.1112.WHST.2.6:	significant for a specific purpose and audience. Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback,
LAES 1112 WILST 2 7	Including new arguments or information. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or
LAF5.1112.WH31.3.7.	broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and
LAFS.1112.WHST.3.8:	limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.1112.WHST.4.10:	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
MAFS.912.F-IF.2.4:	 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i> ★ Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★
MAFS.912.F-IF.3.7:	 a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.G-MG.1.2:	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. \star
MAFS.912.S-IC.2.6:	Evaluate reports based on data. ★
MAFS.912.S-ID.1.1:	Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.2:	deviation) of two or more different data sets. ★ Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the
	characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.3:	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). Clarifications: In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. \star
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. ★
MAFS 912 S-ID 2.6:	 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association.
	Clarifications: Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.
	Make sense of problems and persevere in solving them.
	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the

MAFS.K12.MP.1.1:	original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
	Standard Relation to Course: Supporting Reason abstractly and quantitatively.
MAFS.K12.MP.2.1:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Standard Relation to Course: Supporting Construct viable arguments and critique the reasoning of others.
MAFS.K12.MP.3.1:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Standard Relation to Course: Supporting
MAFS.K12.MP.4.1:	Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose. Standard Balation to Gausso Support
	Use appropriate tools strategically.
MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts. Standard Relation to Course: Supporting
	Attend to precision.
MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Standard Relation to Course: Supporting
MAFS.K12.MP.7.1:	Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – $3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y. Standard Relation to Course: Supporting
	Look for and express regularity in repeated reasoning.
	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a

MAFS.K12.MP.8.1:	repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
	Standard Relation to Course: Supporting
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

While the content focus of this course is consistent with the Astronomy Solar/Galactic course, students will explore these concepts in greater depth. In general, the academic pace and rigor will be greatly increased for honors level course work. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Literacy Standards in Science

Secondary science courses include reading standards for literacy in science and technical subjects 6-12 and writing standards for literacy in history/social studies, science, and technical subjects 6-12. The courses also include speaking and listening standards. For a complete list of standards required for this course click on the blue tile labeled course standards. You may also download the complete course including all required standards and notes sections using the export function located at the top of this page.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

	Course Path: Section: Grades Prek to 12 Education
Course Number: 2020010	Courses > Grade Group: Grades 9 to 12 and Adult
Course Number: 2020910	Education Courses > Subject: Science > SubSubject
	Earth/Space Sciences >
	Abbreviated Title: ASTR S/G HON
Number of Credits: One (1) credit	Course Length: Year (Y)

Course Attributes:

Honors

Course Level: 3

Educator Certifications

Science (Secondary Grades 7-12) Physics (Grades 6-12) Middle Grades General Science (Middle Grades 5-9) Earth/Space Science (Grades 6-12)

Astronomy Solar/Galactic Honors (#2020910) 2022 - And Beyond

Name	Description
SC.912.E.5.7:	Relate the history of and explain the justification for future space exploration and continuing technology development.
SC.912.E.5.8:	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.
SC.912.E.5.9:	Analyze the broad effects of space exploration on the economy and culture of Florida.
SC.912.E.5.10:	Describe and apply the coordinate system used to locate objects in the sky.
SC.912.E.5.11:	Distinguish the various methods of measuring astronomical distances and apply each in appropriate situations.
SC.912.E.6.2:	Connect surface features to surface processes that are responsible for their formation.
SC.912.E.7.7:	Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:
	1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
CO 010 N 1 1	5. Plan investigations, (Design and evaluate a scientific investigation).
SC.912.N.1.1:	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an
	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	set-up, calibration, technique, maintenance, and storage).
	/. Pose answers, explanations, or descriptions of events,
	8. Generate explanations that explicate or describe natural phenomena (interences),
	9. Use appropriate evidence and reasoning to justify these explanations to others,
	10. Communicate results of scientific investigations, and
	The Evaluate the ments of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC 912 N 1 3 [.]	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical
	thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.IN.2.1:	Identify what is science, what clearly is not science, and what superricially resembles science (out fails to meet the criteria for science).
SC.912.N.2.2:	identity which questions can be answered inrough science and which questions are outside the boundaries of scientific investigation, such as
SC 912 N 2 3	destions addressed by other ways of knowing, such as art, principling, and rengion.
56.712.14.2.5.	Evolain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and
SC.912.N.2.4:	re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger.
	leading to its durability.
	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they
SC.912.N.2.5:	make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as
	they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial
	range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those
	relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported
SC 912 N 3 5	Describe the function of models in science, and identify the wide range of models used in science.
SC 912 N / 1	Evolain how scientific knowledge and reasoning provide an empirically based perspective to inform society's decision making
30.712.11.4.1.	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as
SC.912.N.4.2:	human, economic, and environmental.
SC.912.P.8.1:	Differentiate among the four states of matter.
	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons,
SC.912.P.8.4:	and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC 012 D 10 4	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or
30.912.P.10.4:	states of matter.
SC.912.P.10.9:	Describe the quantization of energy at the atomic level.

SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).
SC.912.P.10.11:	Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safet issues.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.10.19:	Explain that all objects emit and absorb electromagnetic radiation and distinguish between objects that are blackbody radiators and those that are not.
SC.912.P.10.20:	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.
SC.912.P.10.21:	Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.
SC.912.P.10.22:	Construct ray diagrams and use thin lens and mirror equations to locate the images formed by lenses and mirrors.
SC.912.P.12.2:	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.
SC.912.P.12.3:	Interpret and apply Newton's three laws of motion.
SC.912.P.12.4:	Ouglitatively apply the concept of angular momentum
SC.912.P.12.7:	Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source ar moving.
SC.912.P.12.8:	Recognize that Newton's Laws are a limiting case of Einstein's Special Theory of Relativity at speeds that are much smaller than the speed of light.
SC.912.P.12.9:	Recognize that time, length, and energy depend on the frame of reference.
	 Mathematicians who participate in effortful learning both individually and with others: Analyze the problem in a way that makes sense given the task. Ask questions that will help with solving the task. Build perseverance by modifying methods as needed while solving a challenging task. Stay engaged and maintain a positive mindset when working to solve tasks. Help and support each other when attempting a new method or approach.
MA.K12.MTR.1.1:	 Help and support each other when attempting a new method or approach. Clarifications: Teachers who encourage students to participate actively in effortful learning both individually and with others: Cultivate a community of growth mindset learners. Foster perseverance in students by choosing tasks that are challenging. Develop students' ability to analyze and problem solve. Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	 Build understanding through modeling and using manipulatives. Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. Progress from modeling problems with objects and drawings to using algorithms and equations. Express connections between concepts and representations. Choose a representation based on the given context or purpose. Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: Help students make connections between concepts and representations. Provide opportunities for students to use manipulatives when investigating concepts. Guide students from concrete to pictorial to abstract representations as understanding progresses. Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: Select efficient and appropriate methods for solving problems within the given context. Maintain flexibility and accuracy while performing procedures and mental calculations. Complete tasks accurately and with confidence. Adapt procedures to apply them to a new context. Use feedback to improve efficiency when performing calculations. Clarifications: Teachers who encourage students to complete tasks with mathematical fluency:
	 Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. Offer multiple opportunities for students to practice efficient and generalizable methods. Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	 Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: Communicate mathematical ideas, vocabulary and methods effectively. Analyze the mathematical thinking of others. Compare the efficiency of a method to those expressed by others. Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes. Construct possible arguments based on evidence.
	 Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.

	 Create opportunities for students to discuss their thinking with peers. Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts.
MA.K12.MTR.5.1:	 Mathematicians who use patterns and structure to help understand and connect mathematical concepts: Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations. Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems.
	Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking. Assess the reasonableness of solutions.
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context. Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task.
	Strengthen students' ability to verify solutions through justifications. Apply mathematics to real-world contexts.
MA.K12.MTR.7.1:	 Mathematicians who apply mathematics to real-world contexts: Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how working as concepts can be applied to other disciplinger.
ELA.K12.EE.1.1:	 Cite evidence to explain and justify reasoning. Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.
ELA.K12.EE.2.1:	Clarifications: See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. Clarifications: Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
	Clarifications: In kindergarten, students learn to listen to one another respectfully.

ELA.K12.EE.4.1:	In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations.
	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

GENERAL NOTES

While the content focus of this course is consistent with the Astronomy Solar/Galactic course, students will explore these concepts in greater depth. In general, the academic pace and rigor will be greatly increased for honors level course work. Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the high school level, all students should be in the science lab or field, collecting data every week. School laboratory investigations (labs) are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the high school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (National Research Council, 2006, p. 77; NSTA, 2007).

Special Notes:

Instructional Practices Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- · Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult

Education Courses > Subject: Science > SubSubject:

Earth/Space Sciences >

Course Length: Year (Y) Course Attributes: • Honors

Course Level: 3

Abbreviated Title: ASTR S/G HON

Course Number: 2020910

Number of Credits: One (1) credit

Course Type: Core Academic Course Course Status: State Board Approved Grade Level(s): 9,10,11,12 Graduation Requirement: Equally Rigorous Science

Educator Certifications

Science (Secondary Grades 7-12) Physics (Grades 6-12) Middle Grades General Science (Middle Grades 5-9) Earth/Space Science (Grades 6-12)

Biotechnology 1 (#3027010) 2015 - 2022 (current)

Name	Description
SC.912.E.6.6:	Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies.
SC.912.L.14.1:	Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.
SC.912.L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).
SC.912.L.14.3:	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.
SC.912.L.14.4:	Compare and contrast structure and function of various types of microscopes.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.
SC.912.L.15.4:	Describe how and why organisms are hierarchically classified and based on evolutionary relationships.
SC.912.L.15.5:	Explain the reasons for changes in how organisms are classified.
SC.912.L.15.6:	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
SC.912.L.15.8:	Describe the scientific explanations of the origin of life on Earth.
SC.912.L.15.15:	Describe how mutation and genetic recombination increase genetic variation.
SC.912.1.16.1:	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.
SC.912.L.16.2:	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
SC 912 16.3	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.6:	Discuss the mechanisms for regulation of gene expression in prokaryotes and eukaryotes at transcription and translation level.
SC.912.L.16.7:	Describe how viruses and bacteria transfer genetic material between cells and the role of this process in biotechnology.
SC.912.L.16.8:	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.
SC.912.L.16.9:	Explain how and why the genetic code is universal and is common to almost all organisms.
SC.912.1.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.11:	Discuss the technologies associated with forensic medicine and DNA identification, including restriction fragment length polymorphism (RFLP) analysis
SC.912.L.16.12:	Describe how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and transformation) is used to construct recombinant DNA molecules (DNA cloning).
SC.912.L.16.14:	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.
SC.912.L.16.16:	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.
SC.912.L.16.17:	Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation.
SC.912.L.17.17:	Assess the effectiveness of innovative methods of protecting the environment.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.4:	Describe the structures of proteins and amino acids. Explain the functions of proteins in living organisms. Identify some reactions that amino acids undergo. Relate the structure and function of enzymes.
SC.912.L.18.6:	Discuss the role of anaerobic respiration in living things and in human society.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.10:	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
	 Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation).
SC.912.N.1.1:	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an

	 organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). 7. Pose answers, explanations, or descriptions of events, 8. Generate explanations that explicate or describe natural phenomena (inferences), 9. Use appropriate evidence and reasoning to justify these explanations to others, 10. Communicate results of scientific investigations, and 11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.8.12:	Describe the properties of the carbon atom that make the diversity of carbon compounds possible.
SC.912.P.10.15:	Investigate and explain the relationships among current, voltage, resistance, and power.
SC.912.P.12.12:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
LA.910.2.2.3 (Archived Standard):	Clarifications: SS.912.C.4.3 Assess human rights policies of the United States and other countries.
LA.910.4.2.2 (Archived Standard):	The student will record information and ideas from primary and/or secondary sources accurately and coherently, noting the validity and reliability of these sources and attributing sources of information;
,	Determine appropriate and consistent standards of measurement for the data to be collected in a survey or experiment.
MA.912.S.1.2 (Archived Standard):	Clarifications: Example: A student is designing a survey to gauge levels of stress in a population of high schools students. Is "stress" something that can be directly measured? How should the student define "stress" so that it can be objectively and consistently measured?
MA.912.S.3.2 (Archived Standard):	Collect, organize, and analyze data sets, determine the best format for the data and present visual summaries from the following: bar graphs line graphs stem and leaf plots circle graphs histograms box and whisker plots scatter plots cumulative frequency (ogive) graphs
	Example: Gather data to answer the question: which area of the country has the highest dropout rate? Display your dropout data in appropriate formats. Example: given a set of data, use appropriate technology to sort the data and to display a histogram or other chart.
	Evaluate how environment and personal health are interrelated.
HE.912.C.1.3:	Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
	Analyze how heredity and family history can impact personal health.
HE.912.C.1.4 (Archived Standard):	Clarifications: Some examples may include drug use, family obesity, heart disease, mental health, and non-communicable illness or disease.

GENERAL NOTES

Credits: 0.5 Science/0.5 CTE

Notes: Laboratory investigations which include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 3027010	Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Integrated Sciences > Section: Career and Technical Education » Cluster: Manufacturing » Career Path: Secondary Programs »Program: 8736000 » Program Version: Industrial Biotechnology » Abbreviated Title: BIOTECH 1 Course Length: Year (Y)
Course Type: Core Academic Course Course Status: Course Approved	Course Level: 3

Grade Level(s): 9,10,11,12

Biotechnology 1 (#3027010) 2022 - And Beyond

Name	Description
SC.912.E.6.6:	Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies.
SC.912.L.14.1:	Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.
CC 010 L 14 0.	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and
SC.912.L.14.2:	active transport).
SC.912.L.14.3:	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.
SC.912.L.14.4:	Compare and contrast structure and function of various types of microscopes.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change
SC 9121 15 A.	Describe how and why organisms are hierarchically classified and based on evolutionary relationships
SC 912 L 15 5	Evolution the reasons for changes in how organisms are classified
SC 912 L 15 6	Discuss distinguishing characteristics of the domains and kingdoms of living organisms
SC 912 L 15 8	Describe the scientific explanations of the origin of life on Earth
SC 912 L 15 15	Describe how mutation and genetic recombination increase genetic variation
SC 012 L 16 1	Use Mendel's laws of segregation and independent assortment to analyze natterns of inheritance
30.712.L.10.1.	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, say linked, polygonic, and
SC.912.L.16.2:	multiple alleles.
SC.912.L.16.3:	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.6:	Discuss the mechanisms for regulation of gene expression in prokaryotes and eukaryotes at transcription and translation level.
SC.912.L.16.7:	Describe how viruses and bacteria transfer genetic material between cells and the role of this process in biotechnology.
SC.912.L.16.8:	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.
SC.912.L.16.9:	Explain how and why the genetic code is universal and is common to almost all organisms.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.11:	Discuss the technologies associated with forensic medicine and DNA identification, including restriction fragment length polymorphism (RFLP) analysis.
SC.912.L.16.12:	Describe how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and transformation) is used to construct recombinant DNA molecules (DNA cloning).
SC 0121 14 14	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining
30.912.L.10.14.	chromosome number during asexual reproduction.
SC.912.L.16.16:	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.
SC.912.L.16.17:	Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation.
SC.912.L.17.17:	Assess the effectiveness of innovative methods of protecting the environment.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC 0121 10 4.	Describe the structures of proteins and amino acids. Explain the functions of proteins in living organisms. Identify some reactions that amino acids
30.712.L.10.4.	undergo. Relate the structure and function of enzymes.
SC.912.L.18.6:	Discuss the role of anaerobic respiration in living things and in human society.
SC.912.L.18.7:	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8:	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.10:	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:
	1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between
	test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations;
	conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
	3. Examine books and other sources of information to see what is already known,
	4. Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of
	existing knowledge and models, and if not, modify or develop new models).
	5. Plan investigations, (Design and evaluate a scientific investigation).
SC.912.N.1.1:	6. Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the
	generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an

	organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including
	set-up, calibration, technique, maintenance, and storage).
	7. Pose answers, explanations, or descriptions of events,
	8. Generate explanations that explicate or describe natural phenomena (interences),
	10. Communicate results of scientific investigations, and
	11. Evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.8.12:	Describe the properties of the carbon atom that make the diversity of carbon compounds possible.
SC.912.P.10.15:	Investigate and explain the relationships among current, voltage, resistance, and power.
SC.912.P.12.12:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.
	Mathematicians who participate in effortful learning both individually and with others:
	Analyze the problem in a way that makes sense given the task.
	 Ask questions that will help with solving the task. Build perseverance by modifying methods as peeded while solving a challenging task.
	 Stay engaged and maintain a positive mindset when working to solve tasks.
	 Help and support each other when attempting a new method or approach.
MA.K12.MTR.1.1:	Clarifications
	Teachers who encourage students to participate actively in effortful learning both individually and with others:
	Cultivate a community of growth mindset learners.
	Foster perseverance in students by choosing tasks that are challenging.
	Develop students' ability to analyze and problem solve.
	Recognize students' effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways.
	Mathematicians who demonstrate understanding by representing problems in multiple ways:
	Build understanding through modeling and using manipulatives.
	 Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
	Progress from modeling problems with objects and drawings to using algorithms and equations.
	Express connections between concepts and representations.
MA.K12.MTR.2.1:	Choose a representation based on the given context or purpose.
	Clarifications:
	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:
	Help students make connections between concepts and representations.
	Provide opportunities for students to use manipulatives when investigating concepts.
	Guide students from concrete to pictorial to abstract representations as understanding progresses.
	 Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:
	Select efficient and appropriate methods for solving problems within the given context.
	Maintain flexibility and accuracy while performing procedures and mental calculations.
	Complete tasks accurately and with complete. Adapt procedures to apply them to a new context
MA.K12.MTR.3.1:	Adapt proceedings to apply them to a new context. Itse feedback to improve efficiency when performing calculations
	Teachers who encourage students to complete tasks with mathematical fluency:
	 Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
	Offer multiple opportunities for students to practice efficient and generalizable methods.
	• Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others.
	Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
	Communicate mathematical ideas, vocabulary and methods effectively.
	Analyze the mathematical thinking of others.
	Compare the efficiency of a method to those expressed by others.

	 Recognize errors and suggest how to correctly solve the task. Justify results by explaining methods and processes
MA.K12.MTR.4.1:	Construct possible arguments based on evidence.
	Clarifications: Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
MA.K12.MTR.5.1:	 Focus on relevant details within a problem. Create plans and procedures to logically order events, steps or ideas to solve problems. Decompose a complex problem into manageable parts. Relate previously learned concepts to new concepts. Look for similarities among problems. Connect solutions of problems to more complicated large-scale situations.
	 Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. Support students to develop generalizations based on the similarities found among problems. Provide opportunities for students to create plans and procedures to solve problems. Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:
MA.K12.MTR.6.1:	 Estimate to discover possible solutions. Use benchmark quantities to determine if a solution makes sense. Check calculations when solving problems. Verify possible solutions by explaining the methods used. Evaluate results based on the given context.
	 Clarifications: Teachers who encourage students to assess the reasonableness of solutions: Have students estimate or predict solutions prior to solving. Prompt students to continually ask, "Does this solution make sense? How do you know?" Reinforce that students check their work as they progress within and after a task. Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts:
MA.K12.MTR.7.1:	 Connect mathematical concepts to everyday experiences. Use models and methods to understand, represent and solve problems. Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
	 Clarifications: Teachers who encourage students to apply mathematics to real-world contexts: Provide opportunities for students to create models, both concrete and abstract, and perform investigations. Challenge students to question the accuracy of their models and methods. Support students as they validate conclusions by comparing them to the given situation. Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning.
ELA.K12.EE.1.1:	Clarifications: K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.
	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.
	6-8 Students continue with previous skills and use a style guide to create a proper citation.
	2 2 state its continue with provide skills and should be aware or existing style galdes and the ways in which they drive.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. Clarifications: See Text Complexity for grade-level complexity bands and a text complexity gubric
	Make inferences to support comprehension.
	Clarifications:

ELA.K12.EE.3.1:	Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.
ELA.K12.EE.4.1:	Clarifications: In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think because" The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work.
ELA.K12.EE.5.1:	Clarifications: Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	Clarifications: In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
HE.912.C.1.3:	Evaluate how environment and personal health are interrelated.
	Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
	Analyze how heredity and family history can impact personal health.
HE.912.C.1.7:	Clarifications: Drug use, family obesity, heart disease, mental health, and non-communicable illness or disease.

GENERAL NOTES

Credits: 0.5 Science/0.5 CTE

Notes: Laboratory investigations which include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- · Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

GENERAL INFORMATION

Course Number: 3027010

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Integrated Sciences > Section: Career and Technical Education » Cluster: Manufacturing » Career Path: Secondary Programs »Program: 8736000 » Program Version: Industrial Biotechnology » Abbreviated Title: BIOTECH 1 Course Length: Year (Y) Course Level: 3

Course Type: Core Academic Course Course Status: Course Approved Grade Level(s): 9,10,11,12

Biotechnology 2 (#3027020) 2015 - And Beyond (current)

Name	Description
SC.912.E.6.6:	Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies.
SC.912.E.7.1:	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
SC.912.L.14.1:	Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.
SC.912.L.14.2:	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).
SC.912.L.14.3:	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.
SC.912.L.14.4:	Compare and contrast structure and function of various types of microscopes.
SC.912.L.14.6:	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
SC.912.L.14.7:	Relate the structure of each of the major plant organs and tissues to physiological processes.
SC.912.L.14.26:	Identify the major parts of the brain on diagrams or models.
SC.912.L.14.36:	Describe the factors affecting blood flow through the cardiovascular system.
SC.912.L.14.37:	Explain the components of an electrocardiogram.
SC.912.L.14.52:	Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.
SC.912.L.15.1:	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.
SC.912.L.15.10:	Identify basic trends in hominid evolution from early ancestors six million years ago to modern humans, including brain size, jaw size, language, and manufacture of tools.
SC.912.L.15.13:	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
SC.912.L.15.14:	Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.
SC.912.L.16.3:	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.
SC.912.L.16.4:	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
SC.912.L.16.5:	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
SC.912.L.16.6:	Discuss the mechanisms for regulation of gene expression in prokaryotes and eukaryotes at transcription and translation level.
SC.912.L.16.7:	Describe how viruses and bacteria transfer genetic material between cells and the role of this process in biotechnology.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.11:	Discuss the technologies associated with forensic medicine and DNA identification, including restriction fragment length polymorphism (RFLP) analysis.
SC.912.L.16.12:	Describe how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and transformation) is used to construct recombinant DNA molecules (DNA cloning).
SC.912.L.16.13:	Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.
SC.912.L.17.2:	Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.
SC.912.L.17.3:	Discuss how various oceanic and freshwater processes, such as currents, tides, and waves, affect the abundance of aquatic organisms.
SC.912.L.17.4:	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.5:	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.
SC.912.L.17.8:	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.9:	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.17.10:	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.12:	Discuss the political, social, and environmental consequences of sustainable use of land.
SC.912.L.17.13:	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.14:	Assess the need for adequate waste management strategies.
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
SC.912.L.18.1:	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.6:	Discuss the role of anaerobic respiration in living things and in human society.
SC.912.L.18.9:	Explain the interrelated nature of photosynthesis and cellular respiration.
SC.912.L.18.11:	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:
	1. Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts).
	2. Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between

SC.912.N.1.1:	 test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.12.12:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.
ELD.K12.ELL.SC.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.
LA.910.2.2.3 (Archived Standard):	Clarifications: SS.912.C.4.3 Assess human rights policies of the United States and other countries.
LA.910.4.2.2 (Archived Standard):	The student will record information and ideas from primary and/or secondary sources accurately and coherently, noting the validity and reliability of these sources and attributing sources of information;
	Determine appropriate and consistent standards of measurement for the data to be collected in a survey or experiment.
MA.912.S.1.2 (Archived Standard):	Clarifications: Example: A student is designing a survey to gauge levels of stress in a population of high schools students. Is "stress" something that can be directly measured? How should the student define "stress" so that it can be objectively and consistently measured?
MA.912.S.3.2 (Archived Standard):	Collect, organize, and analyze data sets, determine the best format for the data and present visual summaries from the following: bar graphs line graphs stem and leaf plots circle graphs histograms box and whisker plots scatter plots cumulative frequency (ogive) graphs Clarifications: Example: Gather data to answer the question: which area of the country has the highest dropout rate? Display your dropout data in appropriate.
	formats. Example: given a set of data, use appropriate technology to sort the data and to display a histogram or other chart. Evaluate how environment and personal health are interrelated.
HE.912.C.1.3:	Clarifications: Food options within a community; prenatal-care services; availability of recreational facilities; air quality; weather-safety awareness; and weather, air, and water conditions.
	Analyze how heredity and family history can impact personal health.
HE.912.C.1.4 (Archived Standard):	Clarifications: Some examples may include drug use, family obesity, heart disease, mental health, and non-communicable illness or disease.

VERSION DESCRIPTION

The most current curriculum framework and other instructional and planning resources for this course are available on the Florida Department of Education website

GENERAL NOTES

Credits: 0.5 Science/0.5 CTE

Notes: Laboratory investigations which include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course.

Special Notes:

Instructional Practices

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

- 1. Ensuring wide reading from complex text that varies in length.
- 2. Making close reading and rereading of texts central to lessons.
- 3. Emphasizing text-specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
- 4. Emphasizing students supporting answers based upon evidence from the text.
- 5. Providing extensive research and writing opportunities (claims and evidence).

Science and Engineering Practices (NRC Framework for K-12 Science Education, 2010)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Science. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/sc.pdf

QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

Biology Grades 6-12 Certification AND Biotechnology District-issued Employment Certificate

OR

Chemistry Grades 6-12 Certification AND Biotechnology District-issued Employment Certificate

GENERAL INFORMATION

Course Number: 3027020

Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Integrated Sciences > Section: Career and Technical Education » Cluster: Manufacturing » Career Path: Secondary Programs »Program: 8736000 » Program Version: Industrial Biotechnology » Abbreviated Title: BIOTECH 2 Course Length: Year (Y) Course Level: 3

Course Type: Core Academic Course Course Status: Draft - Course Pending Approval Grade Level(s): 9,10,11,12

International Baccalaureate Food Science and Technology 1 (#3028300) 2020 - And Beyond (current)

General Course Information and Notes

VERSION DESCRIPTION

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

Course Number: 3028300

Number of Credits: One (1) credit

Course Type: Elective Course Course Status: Draft - Course Pending Approval Grade Level(s): 9,10,11,12 Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Integrated Sciences > Abbreviated Title: IB FOOD SCI & TECH 1 Course Length: Year (Y) Course Attributes: • International Baccalaureate (IB) Course Level: 3

Educator Certifications

cience (Secondary Grades 7-12)
amily and Consumer Science (Grades 6-12)
chool Food Service (Career & Technical)
chool Food Service (District-issued Employment Certificate)
lome Economics Occupations (Career & Technical)
Iome Economics Occupations (District-issued Employment Certificate)
ulinary Operations (Career & Technical)
ulinary Operations (District-issued Employment Certificate)

International Baccalaureate Food Science and Technology 2 (#3028310) 2020 - And Beyond (current)

General Course Information and Notes

VERSION DESCRIPTION

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

Course Number: 3028310

Number of Credits: One (1) credit

Course Type: Elective Course Course Status: Draft - Course Pending Approval Grade Level(s): 9,10,11,12 Course Path: Section: Grades PreK to 12 Education Courses > Grade Group: Grades 9 to 12 and Adult Education Courses > Subject: Science > SubSubject: Integrated Sciences > Abbreviated Title: IB FOOD SCI & TECH 2 Course Length: Year (Y) Course Attributes: • International Baccalaureate (IB) Course Level: 3

Educator Certifications

Science (Secondary Grades 7-12)
amily and Consumer Science (Grades 6-12)
School Food Service (Career & Technical)
School Food Service (District-issued Employment Certificate)
Home Economics Occupations (Career & Technical)
Home Economics Occupations (District-issued Employment Certificate)
Culinary Operations (Career & Technical)
Culinary Operations (District-issued Employment Certificate)