Course Title: **Principles of Biomedical Science**
Course Number: **8708110**
Course Credit: **1**

Course Description:

Students investigate the human body systems and various health conditions. This course is designed to provide an overview of all the courses in the Biomedical Sciences program and lay the scientific foundation for subsequent courses. Students are introduced to human physiology, medicine, research processes and bioinformatics. Key biological concepts including homeostasis, metabolism, inheritance of traits, and defense against disease are embedded in the curriculum. Engineering principles including the design process, feedback loops, and the relationship of structure to function are also incorporated.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
04.0	Demonstrate an understanding of the nature of science and how to correctly use appropriate scientific equipment–The student will be able to:		SC.912.L.14.4 SC.912.N.2.1 SC.912.N.2.2 SC.912.N.3.1 SC.912.N.3.4
04.01	Identify what is science, what clearly is not science and what can superficially resembles science but does not meet the criteria for science.	LAFS.910.RI.2.4 LAFS.910.W.3.7	
04.02	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.	LAFS.910.RI.2.4 LAFS.910.W.3.7	
04.03	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.	LAFS.910.W.3.7 LAFS.910.SL.1.1	
04.04	Practice and demonstrate how to properly and safely use a microscope.	LAFS.910.SL.1.1 LAFS.910.RI.2.4 MAFS.912.N-Q.1.1 MAFS.912.N-Q.1.3	
05.0	Describe the importance of professional ethics and legal responsibilities. –The student		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
	will be able to:		
05.01	Discuss of the basics of the legal framework of the healthcare occupations	LAFS.910.SL.1.1 LAFS.910.RI.3.9	
05.02	Explain common practices that could result in malpractice, liability and/or negligence.	LAFS.910.SL.1.1 LAFS.910.W.1.2	
05.03	Identify standards of the Health Insurance Portability and Accountability Act (HIPAA).	LAFS.910.RI.1.1 LAFS.910.RI.3.9 LAFS.910.SL.1.1 LAFS.910.W.2.4	
05.04	Describe the purpose of Informed Consent from the patient and provider perspective.	LAFS.910.SL.1.1	
05.05	Differentiate between legal and ethical issues in healthcare.	LAFS.910.SL.1.1	
05.06	Evaluate and justify decisions based on ethical reasoning.	LAFS.910.SL.1.1 LAFS.910.RI.3.8	
05.07	Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.	LAFS.910.SL.1.1	HE.912.C.1.3
06.0	Understand the structure and functions of the major human body systems, the organs making up these systems and the interconnections between body systems. –The student will be able to:		SC.912.L.14.2 SC.912.L.14.4 SC.912.L.14.11 SC.912.L.14.13 SC.912.L.14.16 SC.912.L.14.20 SC.912.L.14.26 SC.912.L.14.28 SC.912.L.14.29 SC.912.L.14.30 SC.912.L.14.32 SC.912.L.14.33 SC.912.L.14.42 SC.912.L.14.44 SC.912.L.14.46 SC.912.L.14.51 SC.912.L.14.52 SC.912.L.16.3
06.01	Identify the major body systems and their functions.	LAFS.910.SL.2.4 LAFS.910.L.3.4C,D LAFS.910.W.2.4 LAFS.910.RI.2.4	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
06.02	Demonstrate an understanding of how body systems work together to maintain good health.	LAFS.910.SL.2.4 LAFS.910.L.3.4C,D LAFS.910.W.2.4 LAFS.910.RI.2.4	
06.03	Identify and locate specific organs that comprise the major human body systems.	LAFS.910.SL.2.4 LAFS.910.L.3.4C,D LAFS.910.W.2.4 LAFS.910.RI.2.4	
06.04	Describe the general structure and function of each of these organs.	LAFS.910.SL.2.4 LAFS.910.L.3.4C,D LAFS.910.W.2.4 LAFS.910.RI.2.4	
06.05	Describe how parts of the human body systems work together to perform the job of the entire system.	LAFS.910.SL.2.4 LAFS.910.L.3.4C,D LAFS.910.W.2.4 LAFS.910.W.2.6 LAFS.910.RI.2.4	
06.06	Identify common diseases and conditions that can disrupt the functioning of cells, tissues and organs within the body.	LAFS.910.SL.1.1 LAFS.910.SL.2.4 LAFS.910.W.2.4 LAFS.910.RI.2.4 LAFS.910.L.3.4C,D	
07.0	Understand how determining the cause of death involves the investigation of many aspects of the medical condition of the victim. –The student will be able to:		
07.01	Describe how evidence at a crime scene, such as blood, hair, fingerprints, and shoeprints can help forensic investigators determine what might have occurred and help identify or exonerate potential suspects.		
07.02	Understand that evidence can be seen post-mortem through medical examination and interpret information from an autopsy report to predict the manner of death.	LAFS.910.RI.1.1 LAFS.910.RI.2.4 LAFS.910.SL.1.1	
07.03	Recognize that bloodstain patterns left at a crime scene can help investigators establish the events that took place during the crime.		
07.04	Analyze key information gathered at a simulated crime scene.		
07.05	Describe some of the major aspects involved in determining cause of death, including the gross physical condition of a victim, the need for internal and external examination of the body, and the need for chemical and microscopic analysis of tissues and body fluids.	LAFS.910.RI.1.1 LAFS.910.RI.2.4 LAFS.910.SL.1.1 LAFS.910.W.1.2 LAFS.910.W.2.4	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
	07.06 Discuss how the use of medical terminology and the involvement of many medical professionals are vital to the investigation process.	LAFS.910.SL.1.1	
08.0	Explore various careers related to biomedical science and its impact. –The student will be able to:		
	08.01 Discuss and describe the role of a variety of biomedical sciences professionals that are involved in determining the cause of death.		
	08.02 Describe the role of a certified medical examiner in reducing the chance of death to those on the road (Truckers-DOT/FMSCA), in the air (AC Pilots), and in the water (Boat Captains).	LAFS.910.W.3.7 LAFS.910.SL.1.2	
	08.03 Compare and contrast the role of the medical examiner and the coroner.		
	08.04 Investigate and discuss a variety of biomedical sciences careers that relate to the prevention, diagnosis, and treatment of both cardiovascular and infectious disease.		
09.0	Understand and describe the importance of the circulatory system by examining the structure and function of the heart. –The student will be able to:		SC.912.L.14.36 SC.912.L.14.37 SC.912.L.14.40 SC.912.L.14.52
	09.01 Describe and demonstrate how a simple and a two-chambered pump works.	LAFS.910.L.3.6 LAFS.910.SL.1.1B LAFS.910.SL.1.2 LAFS.910.W.3.7	
	09.02 Understand and discuss that the human heart is a four-chambered living pump that provides the force needed to transport blood, both oxygenated and un-oxygenated, throughout the body without mixing the two types of blood.	LAFS.910.SL.1.1	
	09.03 Identify and describe the gross structures and functions of the heart.	LAFS.910.W.1.2 MAFS.912.G-GMD.2.4	
	09.04 Understand how a heartbeat is caused by the contraction of cardiac muscle cells that result in the movement of blood from the heart to the arteries and to the whole body.	LAFS.910.W.2.4	
	09.05 Calculate heart rate as the number of heart contractions per unit of time, most commonly done as beats per minute.	MAFS.912.N-Q.1.3 MAFS.912.N-Q.1.1	
	09.06 Explain how blood pressure is a measure of the force put on the vascular walls by the blood as it is pushed by the cardiac muscles through the vascular system.	LAFS.910.SL.1.1 MAFS.912.A-CED.1.1 MAFS.912.A-CED.1.4 MAFS.912.N-Q.1.1 MAFS.912.N-Q.1.3 MAFS.912.F-LE.2.5	
	09.07 Describe the flow of electricity through the heart and the result of this electrical	LAFS.910.SL.1.1.	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
	pattern.	LAFS.910.W.2.4 MAFS.912.N-Q.1.1 MAFS.912.N-Q.1.3	
09.08	Indicate how heart rate, blood pressure and EKG can be used to measure a person's medical condition.	LAFS.910.W.2.4 MAFS.912.N-Q.1.3 MAFS.912.N-Q.1.1	
09.09	Describe how selected internal and external factors such as being frightened, exercise, exposure to cold and rest affect heart function including heart rate, blood pressure and EKG.	LAFS.910.SL.1.1B LAFS.910.W.1.2 LAFS.910.W.2.6 LAFS.910.W.3.7 LAFS.910.W.3.8	
09.10	Demonstrate the importance of technology in biomedical sciences by using software and equipment to collect and analyze cardiovascular data.		
10.0	Understand and describe the importance of blood in relation to the circulatory system and the human body. –The student will be able to:		SC.912.L.14.4 SC.912.L.14.11 SC.912.L.14.34
10.01	Explain that blood is a liquid connective tissue composed of red cells, white cells and platelets that are suspended in liquid plasma.	LAFS.910.W.2.4	
10.02	Compare and contrast the functions of red cells, white cells, platelets and erythrocytes	LAFS.910.W.2.4 LAFS.910.SL.1.1	
10.03	Recognize that blood is a major transport for many substances in the body that must be replenished throughout life including hormones, gases, molecules and nutrients.		
10.04	Examine using a microscope and sketch red and white blood cells as well as various types of human tissue.	LAFS.910.W.2.4 MAFS.912.N-Q.1.3	
11.0	Demonstrate an understanding of how food and water are essential to the health of the human body.–The student will be able to:		SC.912.L.18.1 SC.912.L.18.2 SC.912.L.18.10 SC.912.P.8.2 SC.912.P.8.4 SC.912.P.8.6
11.01	Identify the different categories used in a food label and what they mean in relation of the nutrition of the body.	LAFS.910.SL.1.2A,B,D,E,F MAFS.912.N-Q.1.3 MAFS.912.N-Q.1.1	HE.912.C.1.3
11.02	Compare and contrast the recommended daily values for food groups, minerals and vitamins.	LAFS.910.W.2.4 LAFS.910.SL.1.1 MAFS.912.N-Q.1.3 MAFS.912.N-Q.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
11.03	Describe that food is made of molecules and macromolecules which in turn are made of atoms.	LAFS.910.W.2.4 LAFS.910.SL.1.1	
11.04	Describe the structure and function of atoms.	LAFS.910.W.2.4 LAFS.910.SL.1.1	
11.05	Describe how homeostasis depends upon many different chemical reactions and large organic molecules.	LAFS.910.W.2.4 LAFS.910.SL.1.1	
11.06	Describe the role of chemical bonding in chemical reactions and transfer of energy.	LAFS.910.W.2.4 LAFS.910.SL.1.1	
12.0	Describe how food provides nutrients for the body to help maintain homeostasis.–The student will be able to:		SC.912.L.18.1 SC.912.L.18.2 SC.912.L.18.3 SC.912.N.3.5 SC.912.P.8.2 SC.912.P.8.7
12.01	Describe the function of macromolecules in relation to the breakdown of food and the human body.	LAFS.910.W.2.4 LAFS.910.SL.1.1	
12.02	Differentiate between the four classes of macromolecules in terms of their structure and function and build a model of each.	LAFS.910.W.2.4	
12.03	Explain the role of indicators in identifying chemical compounds.	LAFS.910.W.1.2 LAFS.910.SL.1.1	
12.04	Describe different foods that contain each kind of nutrients.	LAFS.910.W.2.4 LAFS.910.SL.1.1	
13.0	Describe and discuss the causes, symptoms, treatments and effects of diabetes and the impact that this specific disease has on the human body and human lifestyle.–The student will be able to:		
13.01	Explain how many systems, living or non-living, operate using feedback mechanisms and that information put into a system causes a reaction within the system.	LAFS.910.W.2.4 LAFS.910.SL.1.1	
13.02	Understand that there are two different types of feedback systems, positive and negative.	LAFS.910.W.2.4 LAFS.910.SL.1.1 LAFS.910.SL.2.4 LAFS.910.W.3.7 LAFS.910.W.3.8	
13.03	Summarize how insulin regulates the transfer of glucose into the body cells and its role as part of the feedback system.	LAFS.910.W.2.4 LAFS.910.W.3.7 LAFS.910.W.3.8 LAFS.910.SL.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
13.04	Compare Type 1 & Type 2 Diabetes.		
13.05	Explain the major causes, symptoms, complications effects and treatments of both Type 1 and Type 2 diabetes.	LAFS.910.W.2.4 LAFS.910.W.3.7 LAFS.910.SL.1.1	
13.06	Understand and describe the dietary requirements and restrictions of diabetics of both types and how these changes can impact one's lifestyle in order to avoid severe and life threatening diabetic emergencies.	LAFS.910.W.1.2 LAFS.910.W.3.7	
13.07	Describe healthy behaviors and actions that could help prevent the onset of Type 2 diabetes.	LAFS.910.W.2.4 LAFS.910.SL.1.1	HE.912.C.1.3
13.08	Investigate and describe the roles of Biomedical Sciences professions related to the treatment and prevention of Diabetes.		
14.0	Investigate the significance of DNA and Chromosomes in the human body.–The student will be able to:		SC.912.L.16.3 SC.912.L.16.9 SC.912.L.18.4
14.01	Describe the Structure and function of a chromosome.	LAFS.910.W.2.4 LAFS.910.SL.1.1	
14.02	Describe the structure and function of deoxyribonucleic acid (DNA).	LAFS.910.W.2.4 LAFS.910.SL.1.1	
14.03	Explain the relationship between chromosomes, DNA and Genes.	LAFS.910.W.2.4 LAFS.910.SL.1.1 LAFS.910.W.3.7	
14.04	Interpret the structure of a chromosome in relation to the size of a cell and the amount of DNA it contains.	LAFS.910.RI.1.1 LAFS.910.W.2.4	
14.05	Explain the interactions between nucleotides using DNA models.	LAFS.910.W.2.4 LAFS.910.SL.1.1	
14.06	Demonstrate how the genetic information in DNA molecules provides instructions for creating protein molecules and that the structure of DNA is basically the same for all living organisms.	LAFS.910.W.1.2F LAFS.910.W.2.4 LAFS.910.SL.1.1	
14.07	Describe the importance of nucleotides in the process of creating protein molecules with the information from DNA.	LAFS.910.W.2.4, LAFS.910.SL.1.1	
14.08	Distinguish between the different levels of proteins and understand that a protein's shape can change depending on its environment.	LAFS.910.W.1.2F LAFS.910.W.2.4 LAFS.910.SL.1.1B,C	
14.09	Explain how the sequence of amino acids in a protein determines the protein's structure.	LAFS.910.W.2.4	
14.10	Describe the appropriate laboratory methods to isolate DNA from plant and animal cells.	LAFS.910.SL.1.1 LAFS.910.W.2.4	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
	14.11 Explain how restriction enzymes cut DNA.		
	14.12 Describe how gel electrophoresis separates DNA fragments.		
	14.13 Recognize that gel electrophoresis can be used to examine DNA differences between individuals.		
15.0	Describe factors that contribute to sickle cell disease and the impact it can have on the human body.–The student will be able to:		SC.912.L.16.8 SC.912.L.17.1
	15.01 Describe the difference between the appearance of normal and sickle cell blood.	LAFS.910.SL.1.1 LAFS.910.W.2.4	
	15.02 Describe the function of hemoglobin found in red cells.	LAFS.910.SL.1.1 LAFS.910.W.2.4	
	15.03 Describe affinity of CO v. O2 to the Hgb of a red blood cell and the practical importance of avoiding CO (auto, home heating systems, engines for pumps brought inside).		
	15.04 Demonstrate how changes to the structure of a protein can change its ability to work properly.	LAFS.910.W.2.4	
	15.05 Compare and contrast the differences between a normal and sickle red blood cell.	LAFS.910.W.2.4 LAFS.910.W.3.7	
	15.06 List the major symptoms and complications of sickle cell disease.	LAFS.910.W.2.4 LAFS.910.W.3.7	
	15.07 Research the occurrence of sickle cell disease between different countries around the world and investigate the reasons for the differences in incidence rates.	LAFS.910.W.2.4 LAFS.910.W.3.7 MAFS.912.S-CP.1.5	
	15.08 Investigate and discuss biomedical sciences careers responsible for the diagnosis and treatment of Sickle Cell Disease.		
16.0	Understand the factors involved in heredity and mutation in relation to sickle cell disease.–The student will be able to:		SC.912.L.15.13 SC.912.L.15.15 SC.912.L.16.1 SC.912.L.16.2 SC.912.L.16.16 SC.912.L.16.17 SC.912.L.17.5
	16.01 Describe that chromosomes each carry numerous genes that are passed along from parents to offspring through reproductive cells.	LAFS.910.SL.1.1 LAFS.910.W.2.4 MAFS.912.S-CP.2.8	HE.912.C.1.7
	16.02 Identify and be able to use a karyotype to identify multiploidy and sex in an individual.	LAFS.910.W.2.4	
	16.03 Compare and contrast between chromosomal and gene mutations.	LAFS.910.W.2.4 LAFS.910.W.3.7	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
16.04	Explain the results of insertion and deletion gene mutations and the effects that they have on the corresponding proteins produced by the gene. Or such as b-globin protein and their associations with Sickle Cell Disease.	LAFS.910.SL.1.1B	HE.912.C.1.7
16.05	Describe the process of meiosis, including independent assortment.	LAFS.910.SL.1.1 LAFS.910.W.2.4	
16.06	Explain how reduction division results in the formation of haploid gametes.	LAFS.910.W.3.7	
16.07	Compare and contrast mitosis and meiosis and relate to the processes of sexual reproduction and their consequences for genetic variation.	LAFS.910.W.2.4 LAFS.910.W.3.7	
16.08	Analyze genotype to determine phenotype.		
16.09	Analyze the major symptoms and complications of the sickle cell trait in relation to sickle cell disease.	LAFS.910.W.2.4 LAFS.910.W.3.7	
16.10	Explain how anemia and lack of energy in a cell are related.	LAFS.910.W.2.4 LAFS.910.W.3.7	
16.11	Use appropriate research techniques to obtain information on the symptoms and complications of the sickle cell trait and disease.	LAFS.910.W.2.4 LAFS.910.W.3.7	
16.12	Create and analyze pedigree charts to illustrate passage of a trait through at least three generations and calculate the probability of a trait appearing in offspring.	LAFS.910.W.2.4 LAFS.910.SL.2.4 MAFS.912.SCP.2.8 MAFS.912.S-CP.2.7	
17.0	Examine how changes in chromosomes or genes can cause disease/chromosomal abnormalities.–The student will be able to:		SC.912.L.16.4
17.01	Define, identify and analyze karyotypes to determine multiploidy and sex.	LAFS.910.W.2.4	
17.02	Explain how karyotypes are used to diagnose certain medical conditions such as Down Syndrome.	LAFS.910.W.2.4	
17.03	Explain how the substitution of a single amino acid can change a protein and indicate how it may change interactions with other proteins.	LAFS.910.W.2.4	
17.04	Identify the structure and function of chromosomes and their role in individual traits of humans.		
17.05	Explain how specific mutations lead to specified genetic diseases.	LAFS.910.W.2.4	
18.0	Demonstrate an understanding of the function of cholesterol in the body and its role in heart disease–The student will be able to:		SC.912.L.18.1 SC.912.L.18.3 SC.912.L.18.4
18.01	Explain that there are different types of lipid molecules and that they have different physical properties and functions.	LAFS.910.SL.1.1 LAFS.910.W.2.4 LAFS.910.W.3.7	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
18.02	Describe how the type of bond between the carbon atoms in a fatty acid determines whether it is saturated or unsaturated with hydrogen atoms.	LAFS.910.W.2.4 LAFS.910.W.3.7	
18.03	Explain that cholesterol is transported in the blood by protein complexes called high density lipoprotein (HDL) and low density lipoprotein (LDL) and the role each of them play in the body.	LAFS.910.W.2.4 LAFS.910.W.3.7 LAFS.910.SL.2.4 LAFS.910.SL.2.5	
18.04	Describe how the measurement of these complexes affects a person's risk for heart disease.	LAFS.910.SL.1.1 LAFS.910.W.2.4	
18.05	Describe the function of an angiogram in diagnosing blocked vessels and list medical interventions to treat blocked vessels.		
18.06	Discuss risk factors for heart disease.		HE.912.C.1.5
19.0	Describe molecular biological techniques for diagnosing diseases, specifically hypercholesterolemia.–The student will be able to:		SC.912.L.16.5 SC.912.L.16.6 SC.912.L.16.11 SC.912.L.16.12
19.01	Explain how the processes of polymerase chain reaction (PCR), and DNA gel electrophoresis can be used in the diagnosis of genetic diseases and disorders such as the familial hypercholesterolemia.	LAFS.910.W.2.4 LAFS.910.W.3.7	
19.02	Explain using proper laboratory techniques how to separate DNA fragments by gel electrophoresis.	LAFS.910.W.2.4	
19.03	Analyze the results of a gel electrophoresis to correctly diagnose the presence of the familial hypercholesterolemia mutation.	LAFS.910.W.1.2A, B, D, E, F MAFS.912.N-Q.1.1 MAFS.912.N-Q.1.3 MAFS.912.S-IC.2.6	
20.0	Demonstrate an understanding of bacteria as a cause for infectious diseases.–The student will be able to:		SC.912.L.14.52 SC.912.L.14.6
20.01	Identify the basic structures of a bacterial cell.		
20.02	Explain that there are different types of bacteria and some cause disease while some do not.	LAFS.910.W.2.4 LAFS.910.W.3.7	
20.03	Classify bacteria by shape, metabolism and reaction to gram staining.	LAFS.910.W.2.4 LAFS.910.W.3.7	
20.04	Understand how antibiotics are used to treat infections and that their effectiveness depends on the type of bacteria that has caused the infection.		
20.05	Explain that overuse of antibiotics can cause resistance in bacteria and what that means to human health.	LAFS.910.W.2.4	
20.06	Describe the immune response in relation to the introduction of antigens.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci/HE
20.07 Isolate and examine bacterial colonies using aseptic techniques.		
20.08 Communicate effectively the symptoms, prevalence, and treatment for bacterial infection as well as the global and social impact of an infectious disease that is caused by bacteria.	LAFS.910.SL.2.4 LAFS.910.W.2.4 LAFS.910.W.2.6 LAFS.910.W.3.7 MAFS.912.S-CP.1.5	SC.912.L.14.6 HE.912.C.1.3 HE.912.C.1.5

Course Title: **Human Body Systems**
Course Number: **8708120**
Course Credit: **1**

Course Description:

Students examine the interactions of body systems as they explore identity, communication, power, movement, protection, and homeostasis. Students design experiments, investigate the structures and functions of the human body, and use data acquisition software to monitor body functions such as muscle movement, reflex and voluntary action, and respiration. Exploring science in action, students build organs and tissues on a skeletal manikin, work through interesting real world cases and often play the role of biomedical professionals to solve medical mysteries.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
21.0	Investigate the basic and complex commonalities between all humans. --The student will be able to:		SC.912.L.14.4 SC.912.L.14.16 SC.912.L.14.20 SC.912.L.14.26 SC.912.L.14.28 SC.912.L.14.29 SC.912.L.14.30 SC.912.L.14.32 SC.912.L.14.33 SC.912.L.14.42 SC.912.L.14.44 SC.912.L.14.46 SC.912.L.14.51 SC.912.L.14.52 SC.912.L.16.13 SC.912.N.1.4
21.01	List the major organs within each human body system and the functions of the different human body systems.	LAFS.910.SL.1.1 LAFS.910.W.1.2 LAFS.910.W.2.4 LAFS.910.L.2.4A,C,D	HE.912.C.1.5
21.02	Describe how multiple body systems are interconnected.	LAFS.910.W.2.4 LAFS.910.SL.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
21.03	Describe how the interconnections and interactions of multiple body systems are necessary for life.	LAFS.910.W.1.2F LAFS.910.W.3.8 LAFS.910.SL.1.1A,C,D	
21.04	Explain how directional terms and regional terms can be used to identify locations on the body.	LAFS.910.SL.1.1 LAFS.910.W.2.4	
21.05	Demonstrate key directional terms on a model of the human body.	LAFS.910.L.3.4 LAFS.910.SL.1.1B LAFS.910.W.1.2F	
21.06	Apply knowledge of human body systems to indicate how damage to one system can impact function in another system.	LAFS.910.W.1.2F LAFS.910.SL.1.1	
21.07	Discuss similarities between all humans and relate this discussion to human identity.	LAFS.910.SL.1.1 LAFS.910.W.4.10	
21.08	Reflect on student's own identity.	LAFS.910.W.4.10	
22.0	Explore the individual differences in tissues and cells between humans and its significance to individual identity. –The student will be able to:		SC.912.L.14.11 SC.912.L.14.12 SC.912.L.14.13 SC.912.L.14.14 SC.912.L.14.15 SC.912.L.16.2
22.01	Describe the differences in the appearance of epithelial and connective tissues.	LAFS.910.L.3.4 LAFS.910.RI.3.7	
22.02	Explain the basic structure and function of the skeletal system.	LAFS.910.L.3.4 LAFS.910.W.2.4	
22.03	Model tissue placement in the face around the eyes and mouth.		
22.04	Interpret bone markings, bone landmarks and bone measurements to provide information about gender, race, ethnicity and height.	LAFS.910.W.1.2F MAFS.912.N-Q.1.1 MAFS.912.N-Q.1.3 MAFS.912.S-ID.1.1	
22.05	Use mathematical calculations to predict height from the length of a bone.	MAFS.912.S-ID.3.7 MAFS.912.N-Q.1.1 MAFS.912.N-Q.1.3 MAFS.912.G-MG.1.3 MAFS.912.F-IF.2.6 MAFS.912.F-LE.2.5	
23.0	Investigate the significance of DNA in relation to individual identity. –The student will be able to:		SC.912.L.16.9 SC.912.L.16.10 SC.912.N.1.5 SC.912.N.1.7 SC.912.N.4.2
23.01	Explain in general how restriction enzymes cut DNA.	LAFS.910.SL.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
		LAFS.910.W.3.8	
	23.02 Explain how gel electrophoresis separates DNA fragments by size.	LAFS.910.SL.1.1 LAFS.910.W.1.2B MAFS.912.N-Q.1.3 MAFS.912.S-IC.2.6	
	23.03 Interpret gel electrophoresis results to solve a missing person's case.	LAFS.910.W.1.2F	
	23.04 Define biometrics and the ethical issues associated with it.	LAFS.910.L.3.4 LAFS.910.SL.1.3	
	23.05 Describe the way in which characteristics such as fingerprints, facial features and retinal patterns can be used to establish identity.	LAFS.910.SL.1.1 LAFS.910.W.3.8	
	23.06 Design a comprehensive security plan for a real-world situation.	LAFS.910.W.2.5 LAFS.910.W.2.6 LAFS.910.RI.3.7 LAFS.910.L.1.1	
	23.07 Read an interview with a forensic anthropologist and write an interview with a DNA analyst.	LAFS.910.RI.2.5 LAFS.910.RI.2.6 LAFS.910.SL.2.4 LAFS.910.W.1.2B	
24.0	Investigate the role the brain plays in the communication system of the human body. – The student will be able to:		SC.912.L. 14.11 SC.912.L. 14.21 SC.912.L. 14.22 SC.912.L. 14.24 SC.912.L. 14.25 SC.912.L. 14.26 SC.912.L. 14.27 SC.912.L. 14.28
	24.01 Describe the general structure and function of the central nervous system.	LAFS.910.L.3.4 LAFS.910.W.2.4	
	24.02 Interpret how a breakdown in communication would impact the function of the human body.	LAFS.910.W.1.2F LAFS.910.SL.1.1B	
	24.03 Determine the region of the brain responsible for specific actions, emotions, or functions of humans.	LAFS.910.W.1.2B LAFS.910.W.3.7 LAFS.910.L.3.4	
	24.04 Apply knowledge of brain function to determine the parts of the brain used to complete a list of daily activities.	LAFS.910.W.1.2B,F LAFS.910.SL1.1A	
25.0	Determine how electrical communication works in the body and its effects. –The student will be able to:		SC.912.L.14.11 SC.912.L.14.21 SC.912.L.14.22 SC.912.L.14.24 SC.912.L.14.25

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
			SC.912.L.16.10 SC.912.N.1.1
25.01	Explain the basics of how electrical signals are created and transmitted in the human body.	LAFS.910.SL.1.1 LAFS.910.W.2.4	
25.02	Explain the roles of ions in creating electrical impulses in the human body.	LAFS.910.SL.1.1 LAFS.910.W.2.4	
25.03	Explain in general terms how neurotransmitters help propagate electrical impulses.	LAFS.910.SL.1.1 LAFS.910.W.2.4	
25.04	Describe neuron structure and function.	LAFS.910.L.3.4 LAFS.910.W.3.7	
25.05	Discuss the generalities of ascending and descending pathways of the CNS.	LAFS.910.SL.1.1	
25.06	Understand how reflex versus reaction time applies to pathways of processing in the brain.	LAFS.910.SL.1.1 MAFS.912.N-Q.1.1 MAFS.912.N-Q.1.3 MAFS.912.S-ID.1.2 MAFS.912.S-IC.2.5 MAFS.912.S-IC.2.6	
25.07	Demonstrate an understanding of how a serious nervous system disorder impacts quality of life.	LAFS.910.SL.1.1B LAFS.910.L.3.4 LAFS.910.W.1.2F	
25.08	Research and report on biomedical professionals who can improve the quality of life for those coping with nervous system dysfunction.	LAFS.910.W.3.8 LAFS.910.RI.1.1	
25.09	Using data acquisition software to complete a laboratory investigation on the reflexes in the human body and reaction time.	LAFS.910.W.1.2 LAFS.910.W.3.7 LAFS.910.L.3.4 MAFS.912.N-Q.1.1 MAFS.912.N-Q.1.3 MAFS.912.S-ID.1.2 MAFS.912.S-IC.2.5 MAFS.912.S-IC.2.6	
26.0	Determine how chemical communication works in the body and its effects. –The student will be able to:		SC.912.L.14.29 SC.912.L.14.30 SC.912.L.14.31 SC.912.L.14.32 SC.912.N.1.1 SC.912.N.1.6
26.01	Explain the basics of how hormones interact with target cells.	LAFS.910.L.3.4 LAFS.910.RI.2.4 LAFS.910.SL.1.1	
26.02	Explain the difference between endocrine and exocrine glands as well as	LAFS.910.L.3.4	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
	protein/peptide and steroid hormones.	LAFS.910.W.1.2D,F	
26.03	Use the internet to research and use the research to interpret the symptoms and physical characteristics of a given patient to determine an endocrine system malfunction.	LAFS.910.L.3.4 LAFS.910.W.1.2F	
26.04	Explain in general how hormones contribute to maintain homeostasis.	LAFS.910.L.3.4 LAFS.910.W.1.2F	
26.05	Understand how a team of medical professionals use an evidence board to help in solving a medical case.	LAFS.910.SL.1.1B,D LAFS.910.W.2.4	
27.0	Investigate how the human body communicates with the outside world. –The student will be able to:		SC.912.L.14.50
27.01	Describe the structures and function of the eye.	LAFS.910.L.3.4 LAFS.910.RI.2.4 LAFS.910.SL.1.1	
27.02	Describe how the eye and the brain work together to allow a person to see.	LAFS.910.L.3.4 LAFS.910.RI.2.4 LAFS.910.SL.1.1	
27.03	Explain visual perception, including visual acuity, depth perception, peripheral vision, color vision, and the interpretation of optical illusions.	LAFS.910.L.3.4 LAFS.910.W.2.4 MAFS.912.N-Q.1.1 MAFS.912.N-Q.1.3	
27.04	Discuss how a medical examiner uses a Snellen Chart at 20 feet with optical occluder (cover) to isolate each eye for individual sight.	LAFS.910.L.3.4 LAFS.910.W.2.4	
27.05	Interpret results from vision testing.	LAFS.910.W.1.2F	
27.06	Understand that different types of lenses will refocus light and correct problems with vision.	LAFS.910.W.2.4 LAFS.910.SL.1.2	
27.07	Understand the difference between an optometrist, an ophthalmologist and an optician.		
28.0	Describe the role food plays in the conversion and use of energy in the body. –The student will be able to:		SC.912.L.14.46 SC.912.L.18.10 SC.912.L.18.11 SC.912.L.14.34 SC.912.L.14.43 SC.912.L.14.44 SC.912.L.14.46 SC.912.L. 17.13 SC.912.N.1.1 SC.912.N.3.5
28.01	Describe the human body systems that absorb process and distribute oxygen, water and food.	LAFS.910.L.3.4 LAFS.910.RI.2.4 LAFS.910.SL.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
28.02	Describe the structure and function of organs in the human digestive system.	LAFS.910.L.3.4 LAFS.910.W.3.7	
28.03	Explain that energy is stored and released from ATP.	LAFS.910.SL.1.1 LAFS.910.W.2.4	
28.04	Assess overall health through analysis of calories consumed and calories expended in daily activities.	LAFS.910.RI.1.2	
28.05	Explain the structure and function of, enzymes and co enzymes and how they all work together.	LAFS.910.W.2.4	
28.06	Explain the importance of enzymes on maintaining homeostasis in the human body.	LAFS.910.W.2.4 LAFS.910.SL.1.1	
28.07	Demonstrate an understanding of both lock and key models and induced fit models of enzyme function.	LAFS.910.W.2.4 LAFS.910.W.3.7 LAFS.910.RI.2.4 LAFS.910.L.3.4C MAFS.912.N-Q.1.2	
28.08	Interpret enzyme function in the digestive system through laboratory experiments.	LAFS.910.W.1.2F LAFS.910.SL.1.1B	
28.09	Build a model of the human digestive system		
28.10	Design and perform an experiment to determine optimal conditions for digestive enzyme reactions.	LAFS.910.SL.1.1B LAFS.910.L.3.4 LAFS.910.W.1.2	
29.0	Describe the role that oxygen plays in the conversion and use of energy in the body. – The student will be able to:		SC.912.L.14.43 SC.912.L.14.44
29.01	Describe the structure and function of the human respiratory system.	LAFS.910.L.3.4 LAFS.910.W.3.7	
29.02	Explain that oxygen and carbon dioxide are exchanged in the lungs and where this occurs.	LAFS.910.SL.1.1 LAFS.910.W.2.4	
29.03	Explain the transport of oxygen to all cells in the body through the close connection between the respiratory and cardiovascular systems.	LAFS.910.SL.1.1 LAFS.910.W.2.4	
29.04	Interpret data charts and graphs to determine tidal volume, aspiratory reserve volume, expiratory reserve volume, and vital capacity of lungs.	LAFS.910.W.1.2F LAFS.910.SL.1.1B MAFS.912.S-IC.2.6 MAFS.912.N-Q.1.1 MAFS.912.N-Q.1.3 MAFS.912.G-MG.1.2	
29.05	Understand the difference between short term control and long term control via medication and that there are different administration routes for each.	LAFS.910.W.3.7 LAFS.910.L.3.4 LAFS.910.W.1.2B MAFS.912.S-IC.2.6 MAFS.912.N-Q.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
		MAFS.912.N-Q.1.3 MAFS.912.G-MG.1.2	
	29.06 Explore the education and career path of a respiratory therapist.	LAFS.910.W.3.7	
30.0	Describe the role that water plays in the conversion and use of energy in the body. – The student will be able to:		SC.912.L.14.47 SC.912.L.14.48 SC.912.L.18.12 SC.912.N.3.1 SC.912.N.3.5
	30.01 Describe the structure and function of the human urinary system.	LAFS.910.L.3.4 LAFS.910.W.3.7	
	30.02 Describe the structure and function of the kidney.	LAFS.910.L.3.4 LAFS.910.W.3.7 MAFS.912.G-GMD.2.4	
	30.03 Describe and illustrate the movement of fluids and ions in and out of the various parts of the nephron.	LAFS.910.L.3.4 LAFS.910.RI.2.4 LAFS.910.SL.1.1	
	30.04 Understand that aldosterone and ADH (anti-diuretic hormone) effect the nephron and overall water balance.	LAFS.910.SL.1.1 LAFS.910.W.1.2F	
	30.05 Illustrate the composition of normal blood and normal urine.		
	30.06 Build a model of the urinary system.	MAFS.912.G-GMD.2.4	
	30.07 Test simulated urine sample and apply knowledge to diagnose disease.	LAFS.910.L.3.4 LAFS.910.W.1.2F	HE.912.C.1.5
	30.08 Analyze the use of urinalysis as a medical intervention.	LAFS.910.W.1.2F LAFS.910.RI.2.4	
31.0	Demonstrate an understanding of how joints directly contribute to the movement of the human body. –The student will be able to:		SC.912.L.14.12 SC.912.N.1.1
	31.01 Describe the structure and function of the three types of human body joints.	LAFS.910.L.3.4 LAFS.910.SL.1.1 LAFS.910.RI.2.4	
	31.02 Describe using appropriate vocabulary, the motion of bones in the different joint types.	LAFS.910.L.3.4 LAFS.910.SL.1.1 LAFS.910.RI.2.4	
	31.03 Identify range of motion measurements to specific joint actions and develop a plan to measure the range of motion.	LAFS.910.W.1.2A,B MAFS.912.N-Q.1.1 MAFS.912.N-Q.1.3	
	31.04 Compare the structure of a cow elbow to a human elbow.	LAFS.910.W.1.2F	
	31.05 Discuss differences in an individual's range of motion and the reason for these differences.	LAFS.910.SL.1.1 LAFS.910.W.4.10	
	31.06 Discuss ways to improve joint flexibility such as stretching and other lifestyle modifications.	LAFS.910.SL.1.1 LAFS.910.W.4.10	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
32.0	Demonstrate an understanding of how muscles directly contribute to the movement of the human body. –The student will be able to:		SC.912.L.14.16 SC.912.L.14.17 SC.912.L.14.18 SC.912.L.14.19 SC.912.L.14.20 SC.912.L.14.22 SC.912.L.14.23
32.01	Describe the structure and function of the three types of muscle tissue.	LAFS.910.L.3.4 LAFS.910.SL.1.1 LAFS.910.RI.2.4	
32.02	Identify specific muscles by deciphering muscle names.		
32.03	Describe the requirements for muscle contraction.	LAFS.910.L.3.4 LAFS.910.RI.2.4 LAFS.910.SL.1.1	
32.04	Explain the sliding filament mechanism of muscle contraction.	LAFS.910.SL.1.1 LAFS.910.W.2.4	
32.05	Explain the connection between nerves and muscle.	LAFS.910.SL.1.1 LAFS.910.W.2.4	
32.06	Interpret muscle function by examining structure and attachment to bone.	LAFS.910.W.1.2F	
32.07	Build a model of a muscle group.	MAFS.912.G-GMD.2.4	
32.08	By using the sliding filament theory, explain why rigor mortis occurs.	LAFS.910.SL.1.1 LAFS.910.W.2.4	
32.09	Discuss how muscle contributes to human identity.	LAFS.910.SL.1.1 LAFS.910.W.4.10	
32.10	Identify some of the many roles of calcium in the body.	LAFS.910.W.1.2A,B	
33.0	Demonstrate an understanding of how blood flow aides in the movement of the substances through the human body. –The student will be able to:		SC.912.L.14.34 SC.912.L.14.35 SC.912.L.14.36 SC.912.L.14.37 SC.912.L.14.38 SC.912.L.14.39 SC.912.L.14.40 SC.912.N.1.1
33.01	Explain the relationship between the heart and lungs and the path of blood flow through these organs.	LAFS.910.SL.1.1 LAFS.910.W.2.4	
33.02	Define pulse and blood pressure, and locate pulse points on the body.	LAFS.910.L.3.4	
33.03	Identify major arteries and veins and specify the body region each supplies.	LAFS.910.L.3.4 LAFS.910.W.2.4	
33.04	Interpret ankle brachial index (ABI) to determine possible blood vessel blockages.	LAFS.910.W.1.2F LAFS.910.SL.1.1B	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
		MAFS.912.N-Q.1.1 MAFS.912.N-Q.1.3 MAFS.912.S-IC.2.6	
	33.05 Understand the relationship between the amount of blood pumped by the heart, through analysis of cardiac output values, and the health of other body organs and systems.	LAFS.910.W.1.2F LAFS.910.RI.2.4 MAFS.912.S-IC.2.6 MAFS.912.S-IC.1.2 MAFS.912.N-Q.1.1 MAFS.912.N-Q.1.3 MAFS.912.F-LE.2.5 MAFS.912.A-CED.1.1 MAFS.912.A-CED.1.4	
	33.06 Explore peripheral artery disease through the analysis of patient symptoms and diagnostic test results.	LAFS.910.RI.2.4 LAFS.910.L.3.4 LAFS.910.SL.1.1B	HE.912.C.1.5
	33.07 Explain the structure and function of veins and explain how varicose veins form.	LAFS.910.SL.1.1 LAFS.910.W.2.4	
	33.08 Build a model of the major circulatory routes.	MAFS.912.G-GMD.2.4	
	33.09 Analyze self-risk for cardiovascular disease.	LAFS.910.W.1.3A,E	HE.912.C.1.5
34.0	Using knowledge of power and movement in the human body, describe how the body fuels and responds to exercise. –The student will be able to:		SC.912.L.18.5 SC.912.L.18.6 SC.912.L.18.8 SC.912.L.18.10 SC.912.N.1.1
	34.01 Explain that the human body generates ATP for energy estimate and the time period that this energy will last.	LAFS.910.RI.2.4 LAFS.910.L.3.4 LAFS.910.SL.1.1	
	34.02 Assess muscle fatigue through interpretation of EMG and grip strength.	LAFS.910.W.1.2 MAFS.912.F-IF.2.4 MAFS.912.F-IF.3.7e	
	34.03 Design experiments to test ability to overcome muscle fatigue.	LAFS.910.W.3.8 LAFS.910.L.2.4	
	34.04 Describe the major things that happen in the major body systems while running a race.	LAFS.910.W.3.7 LAFS.910.L.3.4	
	34.05 Understand how a training plan is designed for a fictional client, incorporating the specific health situation of the client.	LAFS.910.W.3.7 LAFS.910.L.3.4	
	34.06 Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.	LAFS.910.L.3.4 LAFS.910.W.2.4	
35.0	Describe the composition of skin and how the integumentary system serves as a protection for the human body. –The student will be able to:		SC.912.L.14.51 SC.912.N.1.1

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
35.01	Describe the structure and function of human skin.	LAFS.910.RI.2.4 LAFS.910.SL.1.1 LAFS.910.L.3.4	
35.02	Explain burn degree terms in relation to damaged layers of the skin.	LAFS.910.SL.1.1 LAFS.910.W.2.4	
35.03	Explain how burn damage to the skin affects function and homeostasis in the body.	LAFS.910.SL.1.1 LAFS.910.W.2.4	
35.04	Explain in general how the human body senses and processes pain signals.	LAFS.910.SL.1.1 LAFS.910.W.2.4	
35.05	Explain why pain is necessary to human survival.	LAFS.910.SL.1.1 LAFS.910.W.2.4	
35.06	Compare normal human skin and burnt damaged skin.	MAFS.912.G-GMD.2.4	
35.07	Analyze the effects of rehabilitation of a burn victim and changes to everyday life.	LAFS.910.W.1.2F LAFS.910.W.1.3A,E	
36.0	Describe the composition of bones and how the skeletal system serves as a protection for the human body.–The student will be able to:		SC.912.L.14.12 SC.912.L.14.13 SC.912.L.14.14 SC.912.L.14.15 SC.912.N.1.1
36.01	Describe and compare the structure and function of compact and spongy bone.	LAFS.910.RI.2.4 LAFS.910.SL.1.1 LAFS.910.L.3.4	
36.02	Describe types of bone fractures.	LAFS.910.RI.2.4 LAFS.910.SL.1.1 LAFS.910.L.3.4	
36.03	Identify bone fractures on x-rays and describe possible damage to internal organs.	LAFS.910.L.3.4 LAFS.910.W.2.4	
36.04	Understand that the hormones calcitonin and parathyroid hormone have an effect on calcium balance and thus the strength of bone in the human body	LAFS.910.RI.2.4 LAFS.910.SL.1.1 LAFS.910.L.3.4	
36.05	Identify the stages of bone remodeling.	LAFS.910.RI.2.4 LAFS.910.SL.1.1 LAFS.910.L.3.4	
36.06	Identify lifestyle choices that affect development and maintenance of healthy bones.	LAFS.910.L.3.4 LAFS.910.W.2.4	
37.0	Describe the composition the immune system and how it serves as a protection for the human body. –The student will be able to:		SC.912.L.14.42 SC.912.L.14.52
37.01	Describe the general structure and function of the lymphatic and immune system.	LAFS.910.RI.2.4 LAFS.910.SL.1.1 LAFS.910.L.3.4	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
	37.02 Describe in general the interaction between antigens and antibodies.	LAFS.910.RI.2.4 LAFS.910.SL.1.1 LAFS.910.L.3.4	
	37.03 Explain the role of specified blood cells in specific immunity.	LAFS.910.RI.2.4 LAFS.910.SL.1.1 LAFS.910.L.3.4	
	37.04 Understand how a pedigree can assist in determining blood types in a family.	LAFS.910.W.1.2F LAFS.910.RI.2.4 MAFS.912.S-CP.2.8 MAFS.912.S-CP.2.7	
	37.05 Interpret data on antibody concentrations after an infection.	LAFS.910.W.1.2F MAFS.912.S-ID.1.1 MAFS.912.N-Q.1.3 MAFS.912.N-Q.1.1	
	37.06 Determine potential blood donors for a transfusion through the analysis of blood types and Rh compatibility.	LAFS.910.W.1.2 LAFS.910.RI.2.4	
38.0	Examine the connection between all of the human body systems and how these systems work together to maintain health and homeostasis. –The student will be able to:		SC.912.N.1.1
	38.01 Describe the effects of an extreme external environment on human body systems.	LAFS.910.RI.2.4 LAFS.910.L.3.4 LAFS.910.SL.1.1	HE.912.C.1.3
	38.02 Explain in general how body systems work together to maintain homeostasis and complete basic functions.	LAFS.910.SL.1.1 LAFS.910.W.2.4	
	38.03 Understand how initial symptoms of an illness can lead to diagnosis and treatment.	LAFS.910.W.3.8 LAFS.910.L.3.4	
	38.04 Understand the need to valuate medical data to create a unique case study.	LAFS.910.L.3.4 LAFS.910.SL.1.2 LAFS.910.W.1.2 MAFS.912.N-Q.1.1 MAFS.912.N-Q.1.3 MAFS.912.S-IC.2.6	
	38.05 Understand that different diseases require different medical interventions	LAFS.910.W.3.4 LAFS.910.W.3.7 LAFS.910.SL.1.1B LAFS.910.SL.2.4 LAFS.910.L.3.4B	HE.912.C.1.5
	38.06 Research the role of various medical professionals to diagnose and treat a fictional patient.	LAFS.910.W.3.8 LAFS.910.L.3.4	
	38.07 Reflect on self-identity.	LAFS.910.W.1.3A,E	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci/HE
38.08 Write a summary of career goals.	LAFS.910.W.4.10	

Course Title: **Medical Interventions**
Course Number: **8708130**
Course Credit: **1**

Course Description:

Students investigate the variety of interventions involved in the prevention, diagnosis and treatment of disease as they follow the lives of a fictitious family. The course is a "How-To" manual for maintaining overall health and homeostasis in the body as students explore: how to prevent and fight infection; how to screen and evaluate the code in human DNA; how to prevent, diagnose and treat cancer; and how to prevail when the organs of the body begin to fail. Through these scenarios, students are exposed to the wide range of interventions related to immunology, surgery, genetics, pharmacology, medical devices, and diagnostics.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
42.0 Investigate the variety of interventions involved in the prevention, diagnosis and treatment of infectious disease.–The student will be able to:		SC.912.L.16.6 SC.912.L.16.7 SC.912.L.16.9 SC.912.L.16.10 SC.912.L.16.11 SC.912.L.17.1 SC.912.N.4.2
42.01 Define medical interventions and explain how these interventions help prevent, diagnose and treat disease.	LAFS.1112.W.2.4 LAFS.1112.W.3.7 LAFS.1112.SL.1.1	
42.02 Define bioinformatics and explore how it is used in the collection, classification, storage and analysis of biochemical and biological information.	LAFS.1112.W.2.4 LAFS.1112.W.3.7 LAFS.1112.SL.1.1	
42.03 Explain how bacteria can be identified using their DNA sequences.	LAFS.1112.W.2.4 LAFS.1112.W.3.7	
42.04 Investigate the significance of diagnostic tests for infectious diseases.	LAFS.1112.W.2.4 LAFS.1112.W.3.7	
42.05 Graphically organize connections between individuals in a fictitious disease outbreak.	LAFS.1112.W.2.4	
42.06 Determine the concentration of infectious bacteria in simulated body fluids and	LAFS.1112.W.2.4	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	identify infected patients using antibody-based diagnostic tests, such as ELISA assay.	LAFS.1112.SL.1.1B	
43.0	Explore the factors that contribute to the effectiveness of antibiotics against infectious diseases.–The student will be able to:		SC.912.L.14.52 SC.912.L.16.1 SC.912.L.16.6 SC.912.L.16.7 SC.912.L.16.9 SC.912.L.16.10
43.01	Creatively describe the structure of a bacterial cell.	LAFS.1112.RI.1.1 LAFS.1112.W.2.4	
43.02	Investigate how antibiotics disrupt some of the pathways that bacteria need to survive.	LAFS.1112.W.3.7 LAFS.1112.W.2.4	
43.03	Explain how bacteria use various pathways to gain resistance to antibiotics.	LAFS.1112.W.3.7 LAFS.1112.SL.1.1B LAFS.1112.SL.2.4	
43.04	Creatively demonstrate one of the pathways through which bacterial cells transfer genes.	LAFS.1112.W.3.7 LAFS.1112.W.2.4	
43.05	Use a model to simulate the effects of antibiotics on the population of bacteria during an infection.	LAFS.1112.SL.1.1 LAFS.1112.W.2.4	
44.0	Investigate hearing loss as a detrimental effect of infectious disease.–The student will be able to:		SC.912.L.14.5 SC.912.L.16.10 SC.912.N.1.3 SC.912.N.1.4 SC.912.N.1.6 SC.912.N.1.7 SC.912.N.3.5 SC.912.N.4.2 SC.912.P.10.20 SC.912.P.10.21
44.01	Distinguish the properties of sound waves; including frequency and amplitude.	LAFS.1112.W.2.4 MAFS.912.F-TF.2.7	
44.02	Apply knowledge of the structures of the ear to create a model of an ear.	LAFS.1112.W.2.4 LAFS.1112.W.3.7 MAFS.912.G-GMD.2.4	
44.03	Identify and perform tests in which hearing loss can be evaluated.	LAFS.1112.W.2.4	
44.04	Research the variety of interventions and services available to aide those with hearing loss.	LAFS.1112.W.2.4 LAFS.1112.W.3.7	
44.05	Investigate and debate the bioethical concerns related to the use of cochlear	LAFS.1112.W.2.4	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	implant technology.	LAFS.1112.W.3.7 LAFS.1112.SL.1.2	
45.0	Explore vaccination as a mode of infectious disease prevention.–The student will be able to:		SC.912.L.14.42 SC.912.L.14.52 SC.912.L.16.7 SC.912.L.16.10 SC.912.L.16.11 SC.912.L.16.12 SC.912.N.3.1 SC.912.N.4.1
45.01	Explain how vaccines act as medical interventions to defend the body against infectious invaders.	LAFS.1112.W.2.4 LAFS.1112.W.3.7	
45.02	Explore the some of the various laboratory methods in which vaccines are produced.	LAFS.1112.W.2.4 LAFS.1112.W.3.7	
45.03	Define plasmids and explain their significance in genetic engineering.	LAFS.1112.W.2.4 LAFS.1112.L.3.6,	
45.04	Investigate the importance of epidemiologists and the impact these medical professionals have on public health.	LAFS.1112.W.2.4 LAFS.1112.W.3.7 LAFS.1112.W.3.8	
45.05	Describe in general how vaccines interact with the human immune system.	LAFS.1112.W.2.4	
45.06	Interpret data from a disease outbreak to determine the course of the infection.	LAFS.1112.W.2.4 MAFS.912.N-Q.1.1 MAFS.912.N-Q.1.3 MAFS.912.S-IC.2.6	
45.07	Explore vaccination from the perspective of individuals from different generations.	LAFS.1112.W.2.4 LAFS.1112.SL.1.1A	
46.0	Investigate the available types of genetic testing/screening and their ethical implications.–The student will be able to:		SC.912.L.14.6 SC.912.L.16.1 SC.912.L.16.2 SC.912.L.16. 3 SC.912.L.16.4 SC.912.L.16.5 SC.912.L.16.10 SC.912.L.16.11 SC.912.L.16.12 SC.912.N.1.1 SC.912.N.1.3 SC.912.N.1.6

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
46.01	Describe genetic testing and how it is used to determine if someone has a genetic disorder.	LAFS.1112.W.2.4 LAFS.1112.W.3.7	HE.912.C.1.5
46.02	Explain how genetic counseling can positively affect persons who have had genetic testing for various situations.	LAFS.1112.RI.1.1 LAFS.1112.W.3.7 LAFS.1112.W.2.4 LAFS.1112.SL.2.4	
46.03	Amplify a segment of DNA in the laboratory using the Polymerase Chain Reaction (PCR) procedure.		
46.04	Use laboratory techniques such as DNA extraction, PCR, and restriction analysis to identify single base pair differences in DNA.		
46.05	Apply laboratory results to demonstrate the relationship between genotype and phenotype.	LAFS.1112.W.2.4 MAFS.912.S-IC.1.2	HE.912.C.1.7
46.06	Analyze prenatal genetic screening results.	LAFS.1112.W.2.4	HE.912.C.1.7
46.07	Describe the basics of proper prenatal care as well as specified medical interventions used to monitor a pregnancy.	LAFS.1112.W.2.4 LAFS.1112.W.3.7 LAFS.1112.RI.1.2	
46.08	Investigate how a person's ability to taste the chemical PCT, their phenotype, relates to their results from laboratory genetic testing their genotype.	LAFS.1112.W.2.4 LAFS.1112.W.3.7 MAFS.912.S-IC.1.2	
47.0	Examine the current reproductive technology and discuss medical interventions of the future.–The student will be able to:		SC.912.L.16.3 SC.912.L.16.5 SC.912.L.16.13 SC.912.L.16.16 SC.912.N.1.1 SC.912.N.1.3 SC.912.N.1.5 SC.912.N.1.6 SC.912.N.1.7 SC.912.N.2.3 SC.912.N.3.1 SC.912.N.4.1 SC.912.N.4.2
47.01	Explore how gene therapy can be used to treat genetic disorders.	LAFS.1112.W.2.4 LAFS.1112.W.3.7 LAFS.1112.RI.1.2	HE.912.C.1.5
47.02	Discuss and debate the safety and effectiveness of gene therapy.	LAFS.1112.W.2.4 LAFS.1112.W.3.7 LAFS.1112.SL.1.2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	47.03 Explore the various medical interventions parents have available to choose the sex of their future child, including sperm sorting and embryo selection by pre-implantation genetic diagnosis (PDG).	LAFS.1112.W.2.4 LAFS.1112.W.3.7 LAFS.1112.RI.1.1	
	47.04 Discuss the possibility of reproductive cloning and the ethical concerns.	LAFS.1112.W.2.4 LAFS.1112.W.3.7 LAFS.1112.RI.1.2	
	47.05 Evaluate and debate the potential impact of reproductive technology from moral, ethical and scientific perspectives.	LAFS.1112.W.2.4 LAFS.1112.W.3.7 LAFS.1112.RI.1.2	
48.0	Explore the diagnostic techniques and technology being used to better diagnose and understand cancer.–The student will be able to:		SC.912.L.16.5 SC.912.L.16.8
	48.01 Investigate the physiology of cancer and discuss how cancerous cells differ from normal/healthy cells.	LAFS.1112.W.2.4 LAFS.1112.W.3.7 LAFS.1112.RI.1.2	HE.912.C.1.5
	48.02 Describe some of the different uses of x-rays, CT scans, and MRI scans.	LAFS.1112.W.2.4 LAFS.1112.W.3.7	
	48.03 Investigate what DNA microarrays measure and how this information is used to determine differences in gene expression between differing tissues samples.	LAFS.1112.W.2.4 LAFS.1112.W.3.7 MAFS.912.S-IC.2.5 MAFS.912.S-IC.2.6	
	48.04 Using statistical analysis, determine the similarities between gene expression patterns of multiple patients.	LAFS.1112.W.2.4 MAFS.912.S-IC.2.5 MAFS.912.S-IC.2.6	
49.0	Explore the potential risk factors associated with cancer and the various situations which cause changes to DNA.–The student will be able to:		SC.912.L.16.8 SC.912.N.1.5 SC.912.N.1.6 SC.912.N.4.2
	49.01 Describe the potential risk factors for different types of cancer as well as the ways to reduce the risk.	LAFS.1112.W.2.4 LAFS.1112.W.3.7 LAFS.1112.RI.1.2	HE.912.C.1.3
	49.02 Explore some of the various cancer screening techniques that can be used to predict risk for developing cancer.	LAFS.1112.W.2.4 LAFS.1112.W.3.7	HE.912.C.1.5
	49.03 Investigate viruses as a risk factor or cause for certain cancers.	LAFS.1112.W.2.4 LAFS.1112.W.3.7 MAFS.912.S-MD.2.7	
50.0	Investigate the treatments and therapies available to treat cancer and its physical, mental and emotional effects.–The student will be able to:		SC.912.L.16.8 SC.912.N.1.1 SC.912.N.4.2 SC.912.P.8.6

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
			SC.912.P.8.7
50.01	Define and identify the major differences between chemotherapy and radiation therapy.	LAFS.1112.W.2.4 LAFS.1112.W.3.7 LAFS.1112.L.3.4C	HE.912.C.1.5
50.02	Describe in general how chemotherapy drugs interact with and destroy cancer cells.	LAFS.1112.W.2.4 LAFS.1112.W.3.7	HE.912.C.1.5
50.03	Explore biofeedback therapy and how it is utilized to treat cancer and its symptoms.	LAFS.1112.W.2.4 LAFS.1112.W.3.7 MAFS.912.S-IC.2.6	
50.04	Exhibit information on the advances and benefits of prosthetic technology for those who have lost their limbs.	LAFS.1112.W.2.4 LAFS.1112.W.3.7 LAFS.1112.RI.1.1 MAFS.912.S-IC.2.6	
50.05	Explain how physical and occupational therapists help patients with disabilities or recovering from surgery/injury.	LAFS.1112.W.2.4 LAFS.1112.W.3.7 LAFS.1112.W.3.8 LAFS.1112.W.1.2	
51.0	Explore the future of medical interventions for cancer.–The student will be able to:		SC.912.N.1.1 SC.912.N.1.4 SC.912.N.1.6
51.01	Discuss some of the many reasons why therapy drugs do not produce the same effect in all individuals.	LAFS.1112.W.2.4 LAFS.1112.W.3.7 LAFS.1112.SL.1.1	
51.02	Explain how SNP profiles factor into the decision to prescribe a specific medication.	LAFS.1112.W.2.4 LAFS.1112.W.3.7	
51.03	Explore the field of pharmacogenetics and its contributions to the improvement of individualized patient treatment.	LAFS.1112.W.2.4, LAFS.1112.W.3.7	
51.04	Research and present how cases of human abuse have led to strict regulations of human participation in clinical trials.	LAFS.1112.W.2.4 LAFS.1112.W.3.7 MAFS.912.S-MD.2.7	
51.05	Describe the importance of nanomedicine, particularly for cancer research and the development of medical interventions.	LAFS.1112.W.2.4 LAFS.1112.W.3.7	
52.0	Explore the medical implications of proteins produced and purified in a laboratory setting.–The student will be able to:		SC.912.L.16.3 SC.912.L.16.4 SC.912.L.16.6 SC.912.L.16.7 SC.912.L.16.8 SC.912.L.16.10

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
			SC.912.N.1.1 SC.912.N.1.6 SC.912.N.2.4 SC.912.N.3.1 SC.912.N.3.2 SC.912.N.4.1 SC.912.N.4.2
52.01	Discuss how the diagnosis and treatment of diabetes has evolved from the 1800s through today.	LAFS.1112.W.2.4 LAFS.1112.W.3.7 LAFS.1112.RI.1.2	
52.02	Explain the specific bacterial transformation process that they perform.	LAFS.1112.W.2.4 LAFS.1112.W.3.7	
52.03	Define chromatography and how it is used to separate items in a mixture.	LAFS.1112.W.2.4 LAFS.1112.W.3.7 LAFS.1112.L.3.4C LAFS.1112.L.3.6	
52.04	Interpret electrophoresis results to determine the molecular weight of specific proteins in a mixture.	MAFS.912.N-Q.1.3 MAFS.912.S-IC.2.6 MAFS.912.N-Q.1.1	
52.05	Explore and reflect on specific biomedical careers in the manufacturing of therapeutic proteins.	LAFS.1112.W.1.2 LAFS.1112.W.2.4 LAFS.1112.W.3.7 LAFS.1112.W.3.8	
53.0	Investigate the causes and treatments for kidney failure.–The student will be able to:		SC.912.L.14.30 SC.912.L.14.31 SC.912.L.14.35 SC.912.L.14.45 SC.912.L.14.47 SC.912.L.14.52
53.01	Describe End Stage Renal Disease (ESRD) and how it is diagnosed.	LAFS.1112.W.2.4 LAFS.1112.W.3.7	
53.02	Describe the chain of events that result when kidneys do not function properly and how it affects the creation of red blood cells.	LAFS.1112.W.2.4 LAFS.1112.W.3.7 LAFS.1112.RI.1.1	
53.03	Explore the medical options for treatment for persons with ESRD including hemodialysis, peritoneal dialysis and kidney transplant.	LAFS.1112.W.2.4 LAFS.1112.W.3.7	HE.912.C.1.5
54.0	Explore the process, policies and procedures involved for organ transplantation–The student will be able to:		SC.912.L.14.34 SC.912.L.14.35

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
54.01	Consider the integral factors to consider when deciding who should receive an organ transplant.	LAFS.1112.W.2.4 LAFS.1112.W.3.7	
54.02	Describe the importance of blood and tissue typing for a successful organ transplant.	LAFS.1112.W.2.4 LAFS.1112.W.3.7	
54.03	Describe the general steps involved in a live donor laparoscopic nephrectomy.	LAFS.1112.W.2.4 LAFS.1112.W.3.7	
54.04	Compare the major similarities and differences between a heart and a kidney transplant.	LAFS.1112.W.2.4 LAFS.1112.W.3.7 LAFS.1112.RI.1.1	
54.05	Explain the most common ways members of the surgical transplant team work together for a successful transplant.	LAFS.1112.W.2.4 LAFS.1112.SL.1.1	
55.0	Investigate how advances in medical knowledge and technology can aid in building a better human body for the future.–The student will be able to:		SC.912.L.14.11 SC.912.L.14.16 SC.912.L.14.34 SC.912.L.14.35 SC.912.L.14.45 SC.912.L.14.52 SC.912.L.16.10 SC.912.N.1.1 SC.912.N.1.3 SC.912.N.1.5 SC.912.N.1.6 SC.912.N.1.7 SC.912.N.2.1 SC.912.N.2.2 SC.912.N.2.3 SC.912.N.2.4 SC.912.N.4.1 SC.912.N.4.2
55.01	Explore how a variety of tissues and organs can be transplanted from one organism to another.	LAFS.1112.W.2.4 LAFS.1112.W.3.7	
55.02	Describe the general process of how xenotransplantation and tissue engineering works, as well as potential risks, benefits, challenges and ethical/moral concerns.	LAFS.1112.W.2.4 LAFS.1112.W.3.7 LAFS.1112.RI.1.1 LAFS.1112.SL.1.3	
55.03	Reflect on how current methods of medical intervention can be improved.	LAFS.1112.W.2.4	
55.04	Describe how advancing medical knowledge and technology will enable scientists to enhance the human body.	LAFS.1112.W.2.4	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
55.05 Design a potential “super” human using knowledge of the human body and available medical interventions.	LAFS.1112.W.1.2 LAFS.1112.W.2.4 LAFS.1112.W.3.7 LAFS.1112.W.3.8 LAFS.1112.SL.2.4 LAFS.1112.SL.2.5 LAFS.1112.RI.1.1	

Course Title: **Biomedical Innovation**
Course Number: **8708140**
Course Credit: **1**

Course Description:
In this capstone course, students apply their knowledge and skills to answer questions or solve problems related to the biomedical sciences. Students design innovative solutions for the health challenges of the 21st century as they work through progressively challenging open-ended problems, addressing topics such as clinical medicine, physiology, biomedical engineering, and public health

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
56.0	Investigate biomedical problems related to clinical care by designing an effective emergency care center.–The student will be able to:		SC.912.L.16.10 SC.912.N.1.1
56.01	Evaluate the significant role that biomedical innovation plays in treating disease, reducing wait time and promoting efficient care in emergency room and emergency care centers.	LAFS.1112.SL.1.1 LAFS.1112.W.3.8	HE.912.C.1.5
56.02	Analyze website content and assess overall credibility of the information.	LAFS.1112.W.2.6	
56.03	Produce an effective presentation of scientific information by using oral communication skills and PowerPoint presentation.	LAFS.1112.SL.1.1B LAFS.1112.SL.2.4 LAFS.1112.W.3.8 LAFS.1112.L.3.4	
56.04	Using brainstorming and problem solving skills propose solutions to healthcare delivery problems in the 21st century.	LAFS.1112.W.3.8 LAFS.1112.RI.1.1 LAFS.1112.SL.1.1B	
56.05	Design an innovative emergency medicine delivery system.	LAFS.1112.W.2.5 LAFS.1112.W.2.6 LAFS.1112.RI.3.7 LAFS.1112.L.1.1 LAFS.1112.SL.2.4	
56.06	Demonstrate proficiency in using online search engines and journal databases to locate reliable scientific articles.	LAFS.1112.W.2.6	
57.0	Explore the variety of research study designs available and investigate how to set up and conduct valid and reliable studies.–The student will be able to:		SC.912.N.1.1 SC.912.N.1.3 SC.912.N.1.7
57.01	Critique science data presented in popular media and compare this with data presented in scientific journals.	LAFS.1112.W.1.2F LAFS.1112.RI.1.2 MAFS.912.S-IC.1.1 MAFS.912.S-IC.2.6	
57.02	Using knowledge of specified statistical analysis methods, analyze the results of experimental studies.	LAFS.1112.RI.1.1 LAFS.1112.W.3.7	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
		MAFS.912.S-IC.1.2 MAFS.912.S-MD.2.7	
	57.03 Design, conduct and analyze an experimental study to answer a question regarding one or more body systems.	LAFS.1112.W.3.8 LAFS.1112.L.3.4 MAFS.912.S-IC.1.2 MAFS.912.S-MD.2.7	
	57.04 Using at least three statistical fallacies, assume the role of an advertisement sales person selling a fictitious product.	LAFS.1112.SL.1.3 LAFS.1112.W.4.10 MAFS.912.S-MD.2.5	
	57.05 Reflect on the various biomedical career fields related to clinical or research studies and describe two of these career fields.	LAFS.1112.W.3.1A,E LAFS.1112.W.3.7 LAFS.1112.L.3.4	
58.0	Explore the process, knowledge and skills required to design a medical innovation.–The student will be able to:		SC.912.N.1.1 SC.912.N.1.7
	58.01 Investigate the evolution of biomedical products.	LAFS.1112.W.3.7	
	58.02 Brainstorm ideas for a new biomedical product or methods to improve on an existing product.	LAFS.1112.W.3.7	
	58.03 Discuss the concept of design process and how it is significant to medical innovation.	LAFS.1112.SL.1.1	
	58.04 Choose a problem to solve, and then research the past and present solutions to this problem.	LAFS.1112.W.3.8 LAFS.1112.L.3.4 LAFS.1112.L.3.7 LAFS.1112.SL.1.1B	
	58.05 Examine possible design solutions to the problem chosen, select the best approach and develop a design proposal.	LAFS.1112.W.4.10 LAFS.1112.L.3.4	
	58.06 Design a marketing plan to pitch the chosen solution to potential investors.	LAFS.1112.SL.2.4 LAFS.1112.W.1.2F	
59.0	Explore biomedical innovation through investigating water contamination.–The student will be able to:		SC.912.L.14.6 SC.912.L.14.52 SC.912.L.17.13 SC.912.L.17.15 SC.912.L.17.16 SC.912.L.17.17 SC.912.L.17.18 SC.912.N.1.1 SC.912.N.1.4 SC.912.N.1.6
	59.01 List and describe multiple causes of water contamination.	LAFS.1112.SL.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
		LAFS.1112.L.3.4	
	59.02 Explain why water quality is a global issue.	LAFS.1112.SL.1.1 LAFS.1112.W.4.10	HE.912.C.1.3
	59.03 Extrapolate on the cause of non-point source pollution and its implications.	LAFS.1112.W.3.7 LAFS.1112.W.4.10	
	59.04 Using knowledge of specific assays, interpret the results of various chemical and culture assays and identify specific contaminants found.	LAFS.1112.W.1.2F LAFS.1112.W.2.4 LAFS.1112.L.3.4 MAFS.912.S-IC.2.6	
	59.05 Research and propose solutions to prevent or treat water contamination.	LAFS.1112.W.3.8 LAFS.1112.RI.2.4	
	59.06 Determine local potential hazards or sources of contamination of local water samples and research local and Internet resources to investigate the condition of the local water delivery system.	LAFS.1112.W.1.2 LAFS.1112.L.3.4	HE.912.C.1.3
	59.07 Report on the quality of the local water.	LAFS.1112.SL.2.4 LAFS.1112.L.3.4 MAFS.912.S-IC.2.6	HE.912.C.1.3
60.0	Evaluate a public health issue and combat the problem using knowledge of epidemiology, disease diagnosis and public health resources.–The student will be able to:		SC.912.L.14.6 SC.912.L.14.52 SC.912.L.16.3 SC.912.L.16.5 SC.912.L.16.6 SC.912.L.16.7 SC.912.L.16.9 SC.912.L.16.12 SC.912.N.1.1 SC.912.N.1.4 SC.912.N.1.6
	60.01 Discuss the significant role that epidemiologists and public health investigators play in a public health crisis or disease outbreak.	LAFS.1112.W.1.3A, E LAFS.1112.W.3.7 LAFS.1112.L.3.4 MAFS.912.S-IC.1.2 MAFS.912.S-IC.2.6 MAFS.912.N-Q.1.1 MAFS.912.N-Q.1.3	HE.912.C.1.5
	60.02 Describe how to set-up case control and cohort studies.	LAFS.1112.W.2.4	
	60.03 Discuss how measures of association are used to illustrate the correlation between specific risk factors and the development of disease.	LAFS.1112.SL.1.1B	HE.912.C.1.3

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
60.04	Calculate the measures of association used to assess risk in case control and cohort studies.	MAFS.912.S-CP.1.5 MAFS.912.S-IC.2.6	
60.05	List and discuss the various components that may be involved in a public health intervention plan.	LAFS.1112.L.3.4 LAFS.1112.SL.1.1B	
60.06	Determine the source of a mystery illness by examining evidence documents and data including laboratory results, imaging results, disease maps and molecular data.	LAFS.1112.W.3.8 LAFS.1112.SL.2.4 LAFS.1112.SL.1.1B LAFS.1112.L.3.4 MAFS.912.S-IC.1.2 MAFS.912.S-IC.2.6 MAFS.912.S-IC.2.4	
60.07	Research local, national and global health issues and analyze how culture, geographic location and access to health care affect health and wellness.	LAFS.1112.W.3.8 LAFS.1112.SL.1.1B LAFS.1112.SL.2.4 LAFS.1112.L.3.4 LAFS.1112.RI.1.1	HE.912.C.1.3
60.08	Write a grant proposal outlining an intervention plan for a particular public health issue.	LAFS.1112.W.3.8 LAFS.1112.SL.1.1B LAFS.1112.L.3.4	
60.09	Present and defend the proposed intervention plan to a professional audience.	LAFS.1112.SL.2.4	
61.0	Understand medical research and the process of writing a scientific grant.–The student will be able to:		SC.912.N.1.1 SC.912.N.1.3 SC.912.N.1.4 SC.912.N.1.7 SC.912.N.2.4 SC.912.N.4.2
61.01	Define and elaborate on what medical research is used for and how funding for it is obtained.	LAFS.1112.W.3.7	
61.02	Explain the role of a grant in relation to medical research.	LAFS.1112.SL.1.1 LAFS.1112.W.3.7	
61.03	Understand the difference between what constitutes a credible source opposed to a non-credible source when conducting a literature search.	LAFS.1112.W.3.7	
61.04	Distinguished between primary and secondary sources.	LAFS.1112.W.3.7	
61.05	Discuss potential bias based on construct and funding sources of research.	MAFS.912.N-Q.1.3 MAFS.912.N-Q.1.1 MAFS.912.S-IC.2.5 MAFS.912.S-IC.2.6	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
61.06	Discuss the role of an IRB in ensuring safety of a research project prior to data initiation.		
61.07	Understand and identify the process by which a grant is created and the principle components that are present in scientific grant proposals (i.e. abstract, specific aims, background and significance, preliminary data/progress, project description, resources, supplemental materials).	LAFS.1112.W.3.7 LAFS.1112.SL.1.1	
61.08	Prepare, write and present a detailed grant proposal for a research project that will impact a specific aspect of a disease or medical condition.	LAFS.1112.W.3.7 LAFS.1112.SL.2.4 LAFS.1112.SL.2.5 LAFS.1112.W.1.2 LAFS.1112.W.2.6	
62.0	(Optional) Use modern molecular biology techniques to clone and transfer DNA.–The student will be able to:		SC.912.L.16.3 SC.912.L.16.5 SC.912.L.16.6 SC.912.L.16.7 SC.912.L.16.9 SC.912.L.16.12
62.01	Explain the structure and function of plasmids, and how they are used in genetic engineering.	LAFS.1112.L.3.4 LAFS.1112.W.2.4 LAFS.1112.SL.1.1	
62.02	Describe the role restriction enzymes and how they interact with plasmids.	LAFS.1112.W.3.8 LAFS.1112.SL.1.1A,C,D LAFS.1112.W.1.2F	
62.03	Interpret plasmid maps to determine the results of specific digestions with restriction enzymes.	LAFS.1112.W.1.2F	
62.04	Explain how to assemble recombinant DNA and clone a gene of interest using bacterial cells.	LAFS.1112.L.3.4 LAFS.1112.SL.1.1 LAFS.1112.W.2.4	
62.05	Interpret gel electrophoresis results to determine the success of a cloning experiment.	LAFS.1112.W.1.2F MAFS.912.N-Q.1.3 MAFS.912.S-IC.2.6 MAFS.912.N-Q.1.1	
62.06	Using the process of bacterial transformation, insert a new plasmid into bacterial cells.	LAFS.1112.W.3.9 LAFS.1112.RI.3.7	
62.07	Draw and label possible ligation products and describe digestion results for each product.	LAFS.1112.SL.1.1 LAFS.1112.W.2.4	
63.0	(Optional) Assuming the role of a medical expert, investigate a mysterious death using forensics autopsy techniques.–The student will be able to:		SC.912.N.1.1

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci/HE
	63.01 Describe observations of the internal and external anatomy of a fetal pig.	LAFS.1112.W.4.10 LAFS.1112.L.3.4 LAFS.1112.W.1.2F	
	63.02 Evaluate a fetal pig for any abnormalities that may have led to the pig's death.		
	63.03 Complete an autopsy report for the fetal pig.	LAFS.1112.RI.1.2 LAFS.1112.W.2.4 MAFS.912.N-Q.1.1 MAFS.912.N-Q.1.3 MAFS.912.G-GMD.2.4 MAFS.912.S-IC.2.6	
	63.04 Solve the cause of death for a fetal pig by assuming the role of a forensic pathologist.	LAFS.1112.W.1.2F MAFS.912.S-IC.2.6	
	63.05 Design a fictitious death scenario using knowledge of the human body.	LAFS.1112.W.1.2	
	63.06 Create fictitious documents including an autopsy report and medical history to illustrate clues left behind in a dead body.	LAFS.1112.W.1.2 MAFS.912.N-Q.1.1	
	63.07 Research and reflect on the various biomedical careers involved in forensic pathology and describe two of these careers in detail.	LAFS.1112.W.1.3A,E	
64.0	(Optional) Students work independently in an area of interest in the biomedical sciences and outline milestones in a long-term open ended problem using skills learned throughout the program to complete the project. –The student will be able to:	MAFS.912.S-IC.2.3-6	SC.912.N.1.1
	64.01 Choose a topic and describe work previously completed pertaining to that topic.	LAFS.1112.W.3.8 LAFS.1112.L.3.4	
	64.02 Interpret charts, graphs, data sets and any other information related to the project.	LAFS.1112.W.1.2F	
	64.03 Utilize time and project management skills to complete the approved project in the time allotted.		
	64.04 Apply skills and knowledge of researching a topic, evaluating information and decision making in order to complete the project.		
	64.05 Write a well-constructed final report describing the purpose, procedures and results of the project and present this information orally.	LAFS.1112.W.3.8 LAFS.1112.L.3.4 LAFS.1112.SL.2.4	
	64.06 Create a final product related to the project.	LAFS.1112.W.1.2F	
	64.07 Write a self-analysis of what was learned during the project with a focus on whether things should have been done differently or not.	LAFS.1112.W.1.3A,E	
	64.08 Prepare a portfolio of all artifacts related to the project in order to demonstrate the work progression.	LAFS.1112.W.3.8 LAFS.1112.L.3.4	