July 2007

Florida Department of Education
CURRICULUM FRAMEWORK

Program Title:	Technology Studies
Occupational Area:	Technology and Engineering Education
Program Numbers:	8600100
CIP Number:	0821.010100
Grade Level:	Secondary 9-12, & 30, 31
CTSO:	Florida Technology Student Association (FL-TSA)
Certification:	INDUS ARTS @4 @6 I ART-TEC 1 @2 ENG 7G

I. **MAJOR CONCEPTS/CONTENT:** This program provides a student with a foundation in the role of technology in everyday life along with a broad range of technology skills that make them aware of technology around them. Students completing the program will become technologically literate by learning the concepts and role that engineering, design, invention, and innovation have in creating technology systems that help make life easier and better. Students learn that technology must be evaluated to determine the positive and negative effects, and how these have shaped today's global society. The key component of the program is that students become knowledgeable about technology, and use hands-on lessons to apply and transfer this knowledge to common problems.

Listed below are the courses that make up this program. Design code 243 is the appropriate laboratory facility for this program.

8600510 - Technology Studies I
8600610 - Technology Studies II
8601710 - Technology Studies III
8600120 - Foundations of Technology
8600130 - Impacts of Technology
8600140 – Introduction to Design
8600150 - Technological Issues
8600160 - Engineering Design

II. **LABORATORY ACTIVITIES:** Instruction and learning activities are provided in a laboratory setting using hands-on experiences with technology equipment, tools and materials appropriate to the course content.

III. **SPECIAL NOTE:** The Florida Technology Student Association (FL-TSA) is the appropriate Career Student Organization for providing leadership training experiences and reinforcing specific career skills. Career Student Organizations, shall be an integral part of the career instructional program, and the activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, FAC. FL-TSA information can be obtained from the web site at <http://www.floridatsa.com>.

Advanced Technology Applications (AAiT) - course number 8601900 is appropriate to be used for content area continuation in this program after all credits of this program have been completed. The purpose of this course is to provide students with the opportunity to develop a school based project from "vision" to "reality". Working in teams to

design, engineer, manufacture, construct, test, redesign, test again; and then produce a finished "project". This would involve using ALL the knowledge previously learned, not only in Technology Education but also across the curriculum. See the (AAiT) framework for more information.

Work-Based Experience (WBE) - course number 8601800 is the appropriate course to provide Technology Education students with the opportunity, as Student Learners, to gain real world practical, first-hand exposure in broad occupational clusters or industry sectors through a structured, compensated or uncompensated experience. Work-Based Experience is also designed to give the Student Learners an opportunity to apply and integrate the knowledge, skills, and abilities acquired during their School-Based Experience to actual work situations independent of school facilities. At least one credit of a Technology Education program consisting of three credits must be completed before enrolling in WBE. See the (WBE) framework for more information.

The Intermediate and Advanced courses in this program may articulate into post-secondary Tech-Prep 2 + 2 programs when taken in sequence. Tech-Prep 2 + 2 programs require articulation agreements between secondary and post-secondary educational agencies.

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. The comprehensive course table requirements are available online at <http://nwrdc.fsu.edu/fnbpcm02>. Gold Seal Vocational Scholarship requirements are available online at <http://www.myfloridaeducation.com/brfuture/gsvrequire.htm>.

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Adult students with disabilities must self-identify and request such services. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

The student should demonstrate an understanding of prior grade specific knowledge covered in the national *Standards for Technological Literacy** (STL) and the Florida *Sunshine State Standards*. Benchmarks followed by a reference code indicate alignment with one or both of these documents.

* *Standards for Technological Literacy: Content for the Study of Technology*. Copyright 2000 by the International Technology Education Association. Reston, VA.

IV. **INTENDED OUTCOMES:** After successfully completing this program, the student will be able to:

TECHNOLOGICAL LITERACY STANDARDS

1.0 Demonstrate an understanding of the characteristics and scope of technology.

2.0 Demonstrate an understanding of the core concepts of technology.
3.0 Demonstrate an understanding of the relationships among technologies and the connection between technology and other fields of study.
4.0 Demonstrate an understanding of the cultural, social, economic, and political effects of technology.
5.0 Demonstrate an understanding of the effects of technology on the environment.
6.0 Demonstrate an understanding of the role of society in the development and use of technology.
7.0 Demonstrate an understanding of the influence of technology on history.
8.0 Demonstrate an understanding of the attributes of design.
9.0 Demonstrate an understanding of the engineering design.
10.0 Demonstrate an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.
11.0 Demonstrate the abilities to apply the design process.
12.0 Demonstrate the abilities to use and maintain technological products and systems.
13.0 Demonstrate the abilities to assess the impact of products and systems.
14.0 Demonstrate an understanding of and be able to select and use medical technologies.
15.0 Demonstrate an understanding of and be able to select and use agricultural and related biotechnologies.
16.0 Demonstrate an understanding of and be able to select and use energy and power technologies.
17.0 Demonstrate an understanding of and be able to select and use information and communication technologies.
18.0 Demonstrate an understanding of and be able to select and use transportation technologies.
19.0 Demonstrate an understanding of and be able to select and use manufacturing technologies.
20.0 Demonstrate an understanding of and be able to select and use construction technologies.

TECHNICAL CONTENT STANDARDS

21.0 Demonstrate the ability to work safely with a variety of technologies.
22.0 Demonstrate interpersonal skills as they relate to the workplace.
23.0 Identify and apply methods of information acquisition and utilization.
24.0 Apply basic skills in communications, mathematics, and science appropriate to technological content and learning activities.
25.0 Demonstrate and apply design/problem-solving processes.
26.0 Express an understanding of technological systems and their complex interrelationships.
27.0 Demonstrate the ability to properly identify, organize, plan, and allocate resources.
28.0 Discuss individual interests and aptitudes as they relate to a career.
29.0 Demonstrate employability skills.
30.0 Demonstrate an understanding of entrepreneurship.
31.0 Make an informed and meaningful career choice.
32.0 Identify evolving technologies in our technological world.

33.0 Demonstrate knowledge of the basic principles of technology, the basic elements of all systems, and the components of each basic element.
34.0 Demonstrate knowledge and perform special skills unique to the physical technologies.
35.0 Demonstrate knowledge and perform special skills unique to the information/communication technologies.
36.0 Demonstrate knowledge and perform special skills unique to the biotechnologies.
37.0 Demonstrate knowledge of the basic principles of technology, the basic elements of all systems, and the components of each basic element.
38.0 Demonstrate knowledge and perform special skills unique to the physical technologies.
39.0 Demonstrate knowledge and perform special skills unique to the information/communication technologies.
40.0 Demonstrate knowledge and perform special skills unique to the biotechnologies.
41.0 Demonstrate knowledge and application of robotics technology.
42.0 Demonstrate knowledge and application of programmable controller technology.
43.0 Demonstrate the techniques of computer numerical control technology.
44.0 Demonstrate knowledge and application of computer aided drafting technology.
45.0 Demonstrate knowledge and application of laser technology.
46.0 Demonstrate knowledge and application of mechanical systems.
47.0 Demonstrate knowledge and application of fluid systems.
48.0 Demonstrate knowledge and application of electrical systems.
49.0 Demonstrate the use of fiber optics.
50.0 Demonstrate the use of a computer to integrate and control a system composed of mechanical, fluid and electrical systems.
51.0 Conduct a research and experimentation project on a technological material or process.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8600510
Course Title: Technology Studies I
Course Credit: 1

COURSE DESCRIPTION: This course provides students with an introduction to the knowledge, human relations, and technological skills found today in technical professions.

01.0 DEMONSTRATE AN UNDERSTANDING OF THE CHARACTERISTICS AND SCOPE OF TECHNOLOGY.--The student will be able to:

01.01 Discuss the nature and development of technological knowledge and processes. STL.1.J, LA.B.2.4, LA.C.3.4, SC.H.3.4
01.02 Explain the rapid increase in the rate of technological development and diffusion. STL.1.K, LA.B.2.4, LA.D.2.4, MA.B.1.4
01.03 Conduct specific goal-directed research related to inventions and innovations. STL.1.L, LA.A.1.4, LA.A.2.4, LA.B.2.4
01.04 Discuss current technological developments that are/were driven by profit motive and the market. STL.1.M, SS.D.1.4

02.0 DEMONSTRATE AN UNDERSTANDING OF THE CORE CONCEPTS OF TECHNOLOGY.--The student will be able to:

02.01 Identify systems thinking logic and creativity with appropriate compromises in complex real-life problems. STL.2.W
02.02 Define technological systems, which are the building blocks of technology and are embedded within larger technological, social, and environmental systems. STL.2.X, LA.D.2.4
02.03 Identify the stability of a technological system and its influence by all of the components in the system, especially those in the feedback loop. STL.2.Y
02.04 Identify resources involving trade-offs between competing values, such as availability, cost, desirability, and waste. STL.2.Z, SS.D.1.4
02.05 Identify the criteria and constraints of a product or system and then determine how they affect the final design and development. STL.2.AA, MA.A.5.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.E.3.4, SC.H.1.4
02.06 List strategies for optimizing a technological process or methodology of designing or making a product, dependent on criteria and constraints. STL.2.BB
02.07 Identify new technologies that create new processes. STL.2.CC
02.08 Describe a quality control process to ensure that a product, service or system meets established criteria. STL.2.DD
02.09 Define a management system as the process of planning, organizing, and controlling work. STL.2.EE
02.10 Outline complex systems that have many layers of controls and feedback loops to provide information. STL.2.FF

03.0 DEMONSTRATE AN UNDERSTANDING OF THE RELATIONSHIPS AMONG TECHNOLOGIES AND THE CONNECTION BETWEEN TECHNOLOGY AND OTHER FIELDS OF STUDY. --The student will be able to:

03.01 Identify technology transfer occurring when a new user applies an existing innovation developed for one purpose in a different function. STL.3.G, SC.H.3.4
03.02 Identify technological innovation resulting when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields. STL.3.H, SC.H.3.4
03.03 Outline the process of patenting to protect a technological idea. STL.3.I
03.04 Identify technological progresses that promote the advancement of science and mathematics. STL.3.J, LA.A.1.4, LA.B.1.4, SC.H.3.4

04.0 DEMONSTRATE AN UNDERSTANDING OF THE CULTURAL, SOCIAL, ECONOMIC, AND POLITICAL EFFECTS OF TECHNOLOGY.--The student will be able to:

04.01 Identify changes caused by the use of technology ranging from gradual to rapid and from subtle to obvious. STL.4.H
04.02 Classify the use of technology involving weighing the trade-offs between the positive and the negative effects. STL.4.I, LA.B.2.4
04.03 Identify ethical considerations important in the development, selection, and use of technologies. STL.4.J, SC.H.1.4, SS.C.2.4
04.04 List the cultural, social, economic, and political changes caused by the transfer of a technology from one society to another. STL.4.K, LA.B.2.4, LA.E.1.4, SC.H.3.4

05.0 DEMONSTRATE AN UNDERSTANDING OF THE EFFECTS OF TECHNOLOGY ON THE ENVIRONMENT.--The student will be able to:

05.01 Select technologies to conserve water, soil, and energy through such techniques as reusing, reducing and recycling. STL.5.G, SC.G.1.4, SC.G.2.4, SS.B.2.4
05.02 List trade-offs of developing technologies to reduce the use of resources. STL.5.H, SC.G.2.4, SS.D.1.4
05.03 Identify technology to monitor the environment and provide information as a basis for decision-making. STL.5.I, SC.H.3.4
05.04 Compare and contrast the alignment of technological processes with natural processes to maximize performance and reduce negative impacts on the environment. STL.5.J, SC.G.2.4, SS.B.2.4
05.05 Identify technologies devised to reduce the negative consequences of other technologies. STL.5.K
05.06 Discuss the implementation of technologies involving the weighing of trade-offs between predicted positive and negative effects on the environment. STL.5.L, SC.G.2.4, SC.H.3.4

06.0 DEMONSTRATE AN UNDERSTANDING OF THE ROLE OF SOCIETY IN THE DEVELOPMENT AND USE OF TECHNOLOGY.--The student will be able to:

06.01 Investigate how different cultures develop their own technologies to satisfy their individual and shared needs, wants, and values. STL.6.H, LA.D.2.4, SS.B.2.4
06.02 Collect societal opinions and demands, as well as corporate cultures to use as a basis for deciding whether or not to develop a technology. STL.6.I

06.03 Identify a number of different factors, such as advertising, the strength of the economy, the goals of a company, and the latest fads as contributors to shaping the design of and demand for various technologies. STL.6.J, LA.D.2.4, SS.A.1.4, SS.D.2.4

07.0 DEMONSTRATE AN UNDERSTANDING OF THE INFLUENCE OF TECHNOLOGY ON HISTORY.--The student will be able to:

07.01 Research how the evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools and materials. STL.7.H, LA.A.1.4, LA.A.2.4, LA.B.2.4, SC.H.3.4, SS.A.2.4
07.02 Define the history of technology as a powerful force in reshaping the social, cultural, political, and economic landscape. STL.7.I, LA.D.2.4, SS.A.2.4
07.03 Discuss that early in the history of technology, the development of many tools and machines was based not on scientific knowledge but on technological know-how. STL.7.J, SS.A.1.4
07.04 Define the Iron Age as the use of iron and steel as the primary materials for tools. STL.7.K
07.05 Define the Middle Ages and its development of many technological devices that produced long-lasting effects on technology and society. STL.7.L, SS.A.2.4
07.06 Define the Renaissance, a time of rebirth of the arts and humanities, as an important development in the history of technology. STL.7.M, SS.A.3.4
07.07 Define the Industrial Revolution and the development of continuous manufacturing, sophisticated transportation and communication systems, advanced construction practices, and improved education and leisure time. STL.7.N, SS.A.5.4
07.08 Define the Information Age and its placement of emphasis on the processing and exchange of information. STL.7.O, SS.A.5.4

08.0 DEMONSTRATE AN UNDERSTANDING OF THE ATTRIBUTES OF DESIGN.--The student will be able to:

08.01 Recognize the design process; including defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results. STL.8.H
08.02 Restate design problems that are seldom presented in a clearly defined form. STL.8.I, LA.D.1.4, LA.D.2.4
08.03 Check and critique a design continually, and improve and revise the idea of the design as needed. STL.8.J, SC.H.1.4
08.04 List competing requirements of a design, such as criteria, constraints, and efficiency. STL.8.K, MA.A.3.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.D.1.4, MA.D.2.4, MA.E.1.4

09.0 DEMONSTRATE AN UNDERSTANDING OF ENGINEERING DESIGN.--The student will be able to:

09.01 Identify design principles used to evaluate existing designs, to collect data, and to guide the design process. STL.9.I

09.02 Describe the influence of personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly on the Engineering Design process. STL.9.J, LA.D.1.4, SC.H.1.4

09.03 Construct a prototype or a working model used to test a design concept by making actual observations and necessary adjustments. STL.9.K, MA.B.1.4, SC.H.1.4, SC.H.3.4

09.04 Identify factors taken into account in the process of engineering. STL.9.L

10.0 DEMONSTRATE AN UNDERSTANDING OF THE ROLE OF TROUBLESHOOTING, RESEARCH AND DEVELOPMENT, INVENTION AND INNOVATION, AND EXPERIMENTATION IN PROBLEM SOLVING.--The student will be able to:

10.01 Define research and development as a specific problem solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace. STL.10.I

10.02 Identify research needed to solve technological problems. STL.10.J, LA.A.1.4, LA.A.2.4

10.03 Differentiate between technological and non-technological problems, and identify which problems can be solved using technology. STL.10.K, SC.H.1.4

10.04 Utilize a multidisciplinary approach to solving technological problems. STL.10.L, MA.A.1.4, MA.A.3.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.E.1.4, MA.E.3.4, SC.H.1.4, SC.H.3.4

11.0 DEMONSTRATE THE ABILITIES TO APPLY THE DESIGN PROCESS.--The student will be able to:

11.01 Identify the design problem to solve and decide whether or not to address it. STL.11.M, SC.H.1.4

11.02 List criteria and constraints and determine how these will affect the design process. STL.11.N, MA.A.3.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.D.1.4, MA.D.2.4, MA.E.1.4, SC.H.1.4, SC.H.3.4

11.03 Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product. STL.11.0, SC.H.3.4

11.04 Evaluate the design solution using conceptual, physical, and mathematical models at various intervals of the design process in order to check for proper design and to note areas where improvements are needed. STL.11.P, MA.A.4.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, SC.H.1.4, SC.H.3.4

11.05 Develop a product or system using a design process. STL.11.Q

11.06 Evaluate final solutions and communicate observations, processes, and results of the entire design process, using verbal, graphic, quantitative, virtual, and written means, in addition to three-dimensional models. STL.11.R, LA.B.2.4, LA.C.3.4, MA.B.4.4, MA.D.2.4, MA.E.1.4, MA.E.2.4, MA.E.3.4, SC.H.1.4, SC.H.3.4

12.0 DEMONSTRATE THE ABILITIES TO USE AND MAINTAIN TECHNOLOGICAL PRODUCTS AND SYSTEMS.--The student will be able to:

12.01 Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques. STL.12.L, LA.B.2.4, LA.B.1.4, LA.C.3.4

12.02 Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it. STL.12.M

12.03 Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision. STL.12.N
12.04 Operate systems so that they function in the way they were designed. STL.12.O
12.05 Use computers and calculators to access, retrieve, organize, process, maintain, interpret, and evaluate data and information in order to communicate. STL.12.P, LA.A.2.4, MA.E.1.4

13.0 DEMONSTRATE THE ABILITIES TO ASSESS THE IMPACT OF PRODUCTS AND SYSTEMS.--The student will be able to:

13.01 Collect information and evaluate its quality. STL.13.J, LA.A.2.4, SC.H.1.4
13.02 Synthesize data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and the environment. STL.13.K, LA.A.2.4, SC.G.1.4, SC.G.2.4, SC.H.1.4
13.03 Define assessment techniques, such as trend analysis and experimentation to make decisions about the future development of technology. STL.13.L, LA.A.2.4, MA.E.1.4, MA.E.2.4, MA.E.3.4
13.04 Identify forecasting techniques to evaluate the results of altering natural systems. STL.13.M, MA.E.3.4, SC.G.2.4

14.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE MEDICAL TECHNOLOGIES.--The student will be able to:

14.01 Classify medical technologies including prevention and rehabilitation, vaccines and pharmaceuticals, medical and surgical procedures, genetic engineering, and the systems within which health is protected and maintained. (STL 14.K)
14.02 Discuss telemedicine and its convergence of technological advances in a number of fields, including medicine, virtual presence, computer engineering, informatics, artificial intelligence, robotics, materials science, and perceptual psychology. (STL 14.L)
14.03 Explain how the sciences of biochemistry and molecular biology have made it possible to manipulate the genetic information found in living creatures. (STL 14.M)

15.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE AGRICULTURAL AND RELATED BIOTECHNOLOGIES.--The student will be able to:

15.01 Define agriculture, including a combination of businesses that use a wide array of products and systems to produce, process, and distribute food, fiber, fuel, chemical, and other useful products. STL.15.K
15.02 Identify biotechnology applications in such areas as agriculture, pharmaceuticals, food and beverages, medicine, energy, the environment, and genetic engineering. STL.15.L
15.03 Define conservation as the process of controlling soil erosion, reducing sediment in waterways, and improving water quality. STL.15.M
15.04 Apply engineering design processes to management of agricultural systems requiring knowledge of artificial ecosystems and the effects of technological development on flora and fauna. STL.15.N

16.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE ENERGY AND POWER TECHNOLOGIES.--The student will be able to:

16.01 Discuss how energy cannot be created nor destroyed; however, it can be converted from one form to another. STL.16.J
16.02 Categorize types of energy into major forms: thermal, radiant, electrical, mechanical, chemical, nuclear, and others. STL.16.K
16.03 Explain impossibility of building an engine to perform work that does not exhaust thermal energy to the surroundings. STL.16.L
16.04 Classify energy resources as renewable or nonrenewable. STL.16.M
16.05 Construct a power system having a source of energy, a process, and loads. STL.16.N

17.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE INFORMATION AND COMMUNICATION TECHNOLOGIES.--The student will be able to:

17.01 Discuss information and communication technologies including the inputs, processes, and outputs associated with sending and receiving information. STL.17.L
17.02 Classify information and communication systems that allow information to be transferred as human to human, human to machine, machine to human, or machine to machine. STL.17.M
17.03 Use information and communication systems to inform, persuade, entertain, control, manage, and educate. STL.17.N
17.04 Identify components of a communications system, including source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination. STL.17.0
17.05 Identify many ways to communicate information, such as graphic and electronic means. STL.17.P
17.06 Communicate technological knowledge and processes using symbols, measurement, conventions, icons, graphic images, and languages that incorporate a variety of visual, auditory, and tactile stimuli. STL.17.Q

18.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE TRANSPORTATION TECHNOLOGIES.--The student will be able to:

18.01 Analyze the vital role played by transportation in the operation of other technologies, such as manufacturing, construction, communication, health and safety, and agriculture. STL.18.J
18.02 Define intermodalism as the use of different modes of transportation, such as highways, railways, and waterways as part of an interconnected system that can move people and goods easily from one mode to another. STL.18.K
18.03 Discuss how transportation services and methods have led to a population that is regularly on the move. STL.18.L
18.04 Identify processes and innovative techniques involved in the design of intelligent and non-intelligent transportation systems. STL.18.M

19.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE MANUFACTURING TECHNOLOGIES.--The student will be able to:

19.01 Service products to keep them in good operating condition. STL.19.L

19.02 Classify materials based on their qualities as natural, synthetic, or mixed. STL.19.M
19.03 Classify goods as durable goods designed to operate for a long period of time, or non-durable goods designed to operate for a short period of time. STL.19.N
19.04 Identify and classify manufacturing systems into types, such as customized production, batch production, and continuous production. STL.19.0
19.05 Discuss the interchangeability of parts to increase the effectiveness of manufacturing processes. STL.19.P
19.06 Identify chemical technologies providing a means for humans to alter or modify materials and to produce chemical products. STL.19.Q
19.07 Employ marketing techniques involving establishing a product's identity, conducting research on its potential, advertising it, distributing it, and selling it. STL.19.R

20.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE CONSTRUCTION TECHNOLOGIES.--The student will be able to:

20.01 Define infrastructure as the underlying base or basic framework of a system. STL.20.J
20.02 Identify a variety of processes and procedures used in constructing structures. STL.20.K
20.03 Identify requirements involved in the design of structures. STL.20.L
20.04 Recommend maintenance, alterations, or renovations to improve a structure or alter its intended use. STL.20.M
20.05 Identify prefabricated materials used in some structures. STL.20.N

21.0 DEMONSTRATE THE ABILITY TO WORK SAFELY WITH A VARIETY OF TECHNOLOGIES--The student will be able to:

21.01 Select appropriate tools, procedures, and/or equipment needed to produce a product.
21.02 Demonstrate the safe usage of appropriate tools, procedures, and operation of equipment needed to produce a product.
21.03 Demonstrate knowledge required to maintain and troubleshoot equipment used in a variety of technological systems.
21.04 Follow laboratory safety rules and procedures.
21.05 Demonstrate good housekeeping at work station within total laboratory.
21.06 Identify color-coding safety standards.
21.07 Explain fire prevention and safety precautions and practices for extinguishing fires.
21.08 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.

22.0 DEMONSTRATE INTERPERSONAL SKILLS AS THEY RELATE TO THE WORKPLACE--The student will be able to:

22.01 Perform roles in a student personnel system or in the Florida Technology Student Association (FL-TSA).
22.02 Participate as a member of a team.
22.03 Teach others new skills.
22.04 Identify skills needed to serve clients/customers.

22.05 Demonstrate leadership skills.
22.06 Describe strategies necessary for negotiating agreements.
22.07 Demonstrate the application of skills necessary to work with people of diverse backgrounds.
22.08 Form an understanding and appreciation for work after listening to or observing technology workers.
22.09 Form an understanding and appreciation for work after participating in a simulated technology group project in the laboratory.
22.10 Form an understanding and appreciation for the roles and work of co-workers.

23.0 IDENTIFY AND APPLY METHODS OF INFORMATION ACQUISITION AND UTILIZATION--The student will be able to:

23.01 Define terms related to computers.
23.02 Identify and describe methods of information acquisition and evaluation.
23.03 Discuss advantages and disadvantages in the application of technologies.
23.04 Produce a plan to organize and maintain information relevant to emerging technologies.
23.05 Comprehend and communicate information relevant to emerging technologies.
23.06 Demonstrate the use of computers to process information.

24.0 APPLY BASIC SKILLS IN COMMUNICATIONS, MATHEMATICS, AND SCIENCE APPROPRIATE TO TECHNOLOGICAL CONTENT AND LEARNING ACTIVITIES--The student will be able to:

24.01 Identify and explain the main and subordinate ideas in a written work.
24.02 Distinguish different purposes and methods of writing, identify a writer's point of view and tone, and interpret a writer's meaning.
24.03 Define unfamiliar words by use of structural analysis, decoding, contextual clues, or by using a dictionary.
24.04 Distinguish fact from opinion.
24.05 Read critically by asking pertinent questions, by recognizing assumptions and implications, and by evaluating ideas.
24.06 Select, relate, and organize, ideas using outlining and/or graphic organizers and develop the ideas in coherent paragraphs.
24.07 Improve one's own writing by restructuring, correcting errors, and rewriting.
24.08 Gather and organize information from primary and secondary sources; write a report using this research; quote, paraphrase, and summarize accurately; and cite sources properly.
24.09 Vary one's writing style, including vocabulary and sentence structure, for different readers and purposes.
24.10 Write logical and understandable statements, or phrases, to accurately fill out commonly used forms.
24.11 Compose unified and coherent correspondence, directions, descriptions, explanations and reports.
24.12 Participate critically and constructively in the exchange of ideas, particularly during class discussions and conferences with instructors.

24.13 Conceive and develop ideas about a topic for the purpose of speaking to a group; choose and organize related ideas; present them clearly in Standard English; and evaluate similar presentations by others.
24.14 Use the mathematics of:
- integers, fractions, and decimals;
- ratios, proportions, and percentages;
- roots and powers;
- algebra;
- geometry.
24.15 Make estimates and approximations, and judge the reasonableness of a result.
24.16 Use elementary concepts of probability and statistics.
24.17 Draw, read, and analyze graphs, charts, and tables.
24.18 Ask appropriate scientific questions and recognize what is involved in experimental approaches to the solutions of such questions through familiarity with laboratory and field work.
24.19 Organize and communicate the results obtained by observation and experimentation.
24.20 Apply the basic principles of biology, physics, and chemistry (properties of matter; structure of compounds; concepts of motion; temperature, pressure and volume; work, power, force and energy; machines; human cell structure).
24.21 Identify problems rooted in basic biology, physics, or chemistry (effects of hazardous materials on health and safety, effects of drugs on health, trouble shooting problems on a machine).

25.0 DEMONSTRATE AND APPLY DESIGN/PROBLEM-SOLVING PROCESSES--The student will be able to:

25.01 Describe and explain steps in the design/problem-solving process.
25.02 Propose solutions to given problems.
25.03 Design and implement the optimal solution to a given problem.
25.04 Document each step of the design/problem-solving process.
25.05 Demonstrate "brainstorming" as a process to solve problems.
25.06 Define "critical thinking" and its value in the problem-solving process.

26.0 EXPRESS AN UNDERSTANDING OF TECHNOLOGICAL SYSTEMS AND THEIR COMPLEX INTERRELATIONSHIPS--The student will be able to:

26.01 Demonstrate knowledge of how social, organizational, and technological systems work.
26.02 Explore methods used to monitor and correct performance of technological systems.
26.03 Design and implement an optimal solution to a given problem.
26.04 Outline major historical technological developments or events.
26.05 Identify recent advances in technology.
26.06 Explain problem-solving roles of technology.
26.07 Forecast a technological development or event.
26.08 Define technology.

27.0 DEMONSTRATE THE ABILITY TO PROPERLY IDENTIFY, ORGANIZE, PLAN, AND ALLOCATE RESOURCES--The student will be able to:

27.01 Demonstrate the ability to select goal-relevant activities, rank them, allocate time, and prepare and follow schedules.

27.02 Use or prepare budgets, make forecasts, keep records, and make adjustments to meet objectives.
27.03 Demonstrate the ability to acquire, store, allocate, and use materials or space efficiently.
27.04 Display knowledge of the efficient use of human resources.

28.0 DISCUSS INDIVIDUAL INTERESTS AND APTITUDES AS THEY RELATE TO A CAREER--The student will be able to:

28.01 Describe individual strengths and weaknesses.
28.02 Discuss individual interests related to a career.
28.03 Identify careers within specific areas of technology.
28.04 Explore careers within specific areas of interest.

29.0 DEMONSTRATE EMPLOYABILITY SKILLS--The student will be able to:

29.01 Conduct a job search.
29.02 Secure information about a career.
29.03 Identify documents that may be required when applying for a job interview.
29.04 Complete a job application form correctly.
29.05 Demonstrate competence in job interview techniques.
29.06 Prepare a resume for a job.

30.0 DEMONSTRATE AN UNDERSTANDING OF ENTREPRENEURSHIP--The student will be able to:

30.01 Define entrepreneurship.
30.02 Describe the importance of entrepreneurship to the American economy.
30.03 List the advantages and disadvantages of business ownership.
30.04 Identify the risks involved in ownership of a business.
30.05 Identify the necessary personal characteristics of a successful entrepreneur.
30.06 Identify the business skills needed to operate a small business efficiently and effectively.

31.0 MAKE AN INFORMED AND MEANINGFUL CAREER CHOICE--The student will be able to:

31.01 Make a tentative occupational choice based on the information learned and interest developed in this course.
31.02 Review tentative occupational choices based on the information learned and interest developed in this course.

32.0 IDENTIFY EVOLVING TECHNOLOGIES IN OUR TECHNOLOGICAL WORLD--The student will be able to:

32.01 List five technologies that did not exist five years ago.
32.02 Use the problem-solving process to generate three potential improvements to a recent or evolving technology.

33.0 DEMONSTRATE KNOWLEDGE OF THE BASIC PRINCIPLES OF TECHNOLOGY, THE BASIC ELEMENTS OF ALL SYSTEMS, AND THE COMPONENTS OF EACH BASIC ELEMENT--The student will be able to:

33.01 Define the six basic principles of technology: force, work, rate, resistance, energy, and power.
33.02 Name and define the three basic elements of all systems.
33.03 Name components of the three basic elements of a system.
33.04 Name the six basic parts of the energy system.
33.05 State the function of each of the basic parts of the energy system.
33.06 Name and explain the functions of the four common working energy systems: mechanical, electrical, fluid, and thermal.

34.0 DEMONSTRATE KNOWLEDGE AND PERFORM SPECIAL SKILLS UNIQUE TO THE PHYSICAL TECHNOLOGIES--The student will be able to:

34.01 Define the function of construction technology, energy and power technology, manufacturing technology, and transportation technology.
34.02 Describe three careers for each of the physical technologies identified in 14.01.
34.03 Identify and demonstrate the tools, processes, and materials used in construction technology.
34.04 Identify and demonstrate the equipment, processes, and materials used in energy and power technology for converting and transmitting power.
34.05 Identify and demonstrate the tools, processes, and materials used in manufacturing technology to perform computer-aided manufacturing.
34.06 Identify and demonstrate various ways that people and goods are transported.
34.07 Demonstrate problem-solving skills relative to the physical technologies utilizing the techniques learned in this course.

35.0 DEMONSTRATE KNOWLEDGE AND PERFORM SPECIAL SKILLS UNIQUE TO THE INFORMATION/COMMUNICATION TECHNOLOGIES--The student will be able to:

35.01 Define the function of information processing technology, graphic communication technology, and electronic communication technology.
35.02 Describe three careers for each of the communications technologies identified in 15.01.
35.03 Identify and demonstrate the tools, processes and materials used in the information/communication technologies.
35.04 Compare and contrast different processes of communication technologies.
35.05 Demonstrate modern communication systems using sound and speech, symbols and codes, printed words, drawing and pictures.
35.06 Identify the function of information processing technology, graphic communication technology, and electronic communication technology.
35.07 Identify several telecommunication services.
35.08 Demonstrate problem-solving skills relative to the information communication technologies utilizing the techniques learned in this course.

36.0 DEMONSTRATE KNOWLEDGE AND PERFORM SPECIAL SKILLS UNIQUE TO THE BIOTECHNOLOGIES--The student will be able to:

36.01 Define the function of biotechnology, medical technology, food production technology, and agriculture technology.
36.02 Describe three careers for each of the technology areas in 16.01.
36.03 Explain the three areas into which modern biotechnology is divided.
36.04 Contrast the seven resources for biotechnology with other technologies.
36.05 Identify several impacts of biotechnology on society and the environment.
36.06 Identify the role of biotechnology in agriculture, food production, and medicine.
36.07 Identify and describe the processes used in biotechnology and the related areas of produce outputs.
36.08 Identify several outputs of biotechnology and their related biotechnologies.
36.09 Demonstrate problem solving skills relative to biotechnology, or a related biotechnology utilizing the techniques learned in this course.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8600610
Course Title: Technology Studies II
Course Credit: 1

COURSE DESCRIPTION: This program provides students with an intermediate understanding of the knowledge, human relations, and technological skills found today in technical professions.

01.0 DEMONSTRATE AN UNDERSTANDING OF THE CHARACTERISTICS AND SCOPE OF TECHNOLOGY.--The student will be able to:

01.01 Illustrate the nature and development of technological knowledge and processes. STL.1.J, LA.B.2.4, LA.C.3.4, SC.H.3.4
01.02 Graph the rapid increase in the rate of technological development and diffusion. STL.1.K, LA.B.2.4, LA.D.2.4, MA.B.1.4
01.03 Conduct specific goal-directed research related to inventions and innovations. STL.1.L, LA.A.1.4, LA.A.2.4, LA.B.2.4
01.04 Evaluate current technological developments that are/were driven by profit motive and the market. STL.1.M, SS.D.1.4

02.0 DEMONSTRATE AN UNDERSTANDING OF THE CORE CONCEPTS OF TECHNOLOGY.--The student will be able to:

02.01 Apply systems thinking logic and creativity with appropriate compromises in complex real-life problems. STL.2.W
02.02 Discuss technological systems, which are the building blocks of technology and are embedded within larger technological, social, and environmental systems. STL.2.X, LA.D.2.4
02.03 Assess the stability of a technological system and its influence by all of the components in the system, especially those in the feedback loop. STL.2.Y
02.04 Select resources involving trade-offs between competing values, such as availability, cost, desirability, and waste. STL.2.Z, SS.D.1.4
02.05 Identify the criteria and constraints of a product or system and then determine how they affect the final design and development. STL.2.AA, MA.A.5.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.E.3.4, SC.H.1.4
02.06 Implement strategies for optimizing a technological process or methodology of designing or making a product, dependent on criteria and constraints. STL.2.BB
02.07 Identify new technologies that create new processes. STL.2.CC
02.08 Describe a quality control process to ensure that a product, service or system meets established criteria. STL.2.DD
02.09 Organize a management system as the process of planning, organizing, and controlling work. STL.2.EE
02.10 Outline complex systems that have many layers of controls and feedback loops to provide information. STL.2.FF

03.0 DEMONSTRATE AN UNDERSTANDING OF THE RELATIONSHIPS AMONG TECHNOLOGIES AND THE CONNECTION BETWEEN TECHNOLOGY AND OTHER FIELDS OF STUDY. --The student will be able to:

03.01 Discuss technology transfer occurring when a new user applies an existing innovation developed for one purpose in a different function. STL.3.G, SC.H.3.4
03.02 Explain technological innovation resulting when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields. STL.3.H, SC.H.3.4
03.03 Report the process of patenting to protect a technological idea. STL.3.I
03.04 Discuss technological progresses that promote the advancement of science and mathematics. STL.3.J, LA.A.1.4, LA.B.1.4, SC.H.3.4

04.0 DEMONSTRATE AN UNDERSTANDING OF THE CULTURAL, SOCIAL, ECONOMIC, AND POLITICAL EFFECTS OF TECHNOLOGY.--The student will be able to:

04.01 Discuss changes caused by the use of technology ranging from gradual to rapid and from subtle to obvious. STL.4.H
04.02 Compare the use of technology involving weighing the trade-offs between the positive and the negative effects. STL.4.I, LA.B.2.4
04.03 Discuss ethical considerations important in the development, selection, and use of technologies. STL.4.J, SC.H.1.4, SS.C.2.4
04.04 Debate the cultural, social, economic, and political changes caused by the transfer of a technology from one society to another. STL.4.K, LA.B.2.4, LA.E.1.4, SC.H.3.4

05.0 DEMONSTRATE AN UNDERSTANDING OF THE EFFECTS OF TECHNOLOGY ON THE ENVIRONMENT.--The student will be able to:

05.01 Devise technologies to conserve water, soil, and energy through such techniques as reusing, reducing and recycling. STL.5.G, SC.G.1.4, SC.G.2.4, SS.B.2.4
05.02 Compare trade-offs of developing technologies to reduce the use of resources. STL.5.H, SC.G.2.4, SS.D.1.4
05.03 Use technology to monitor the environment and provide information as a basis for decision-making. STL.5.I, SC.H.3.4
05.04 Compare and contrast the alignment of technological processes with natural processes to maximize performance and reduce negative impacts on the environment. STL.5.J, SC.G.2.4, SS.B.2.4
05.05 Assess technologies devised to reduce the negative consequences of other technologies. STL.5.K
05.06 Make decisions about the implementation of technologies involving the weighing of trade-offs between predicted positive and negative effects on the environment. STL.5.L, SC.G.2.4, SC.H.3.4

06.0 DEMONSTRATE AN UNDERSTANDING OF THE ROLE OF SOCIETY IN THE DEVELOPMENT AND USE OF TECHNOLOGY.--The student will be able to:

06.01 Report how different cultures develop their own technologies to satisfy their individual and shared needs, wants, and values. STL.6.H, LA.D.2.4, SS.B.2.4
06.02 Consider societal opinions and demands, as well as corporate cultures to use as a basis for deciding whether or not to develop a technology. STL.6.I

06.03 Consider a number of different factors, such as advertising, the strength of the economy, the goals of a company, and the latest fads as contributors to shaping the design of and demand for various technologies. STL.6.J, LA.D.2.4, SS.A.1.4, SS.D.2.4

07.0 DEMONSTRATE AN UNDERSTANDING OF THE INFLUENCE OF TECHNOLOGY ON HISTORY.--The student will be able to:

07.01 Discuss how the evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools and materials. STL.7.H, LA.A.1.4, LA.A.2.4, LA.B.2.4, SC.H.3.4, SS.A.2.4
07.02 Research the history of technology as a powerful force in reshaping the social, cultural, political, and economic landscape. STL.7.I, LA.D.2.4, SS.A.2.4
07.03 Debate that early in the history of technology, the development of many tools and machines was based not on scientific knowledge but on technological know-how. STL.7.J, SS.A.1.4
07.04 Discuss the Iron Age as the use of iron and steel as the primary materials for tools. STL.7.K
07.05 Discuss the Middle Ages and its development of many technological devices that produced long-lasting effects on technology and society. STL.7.L, SS.A.2.4
07.06 Discuss the Renaissance, a time of rebirth of the arts and humanities, as an important development in the history of technology. STL.7.M, SS.A.3.4
07.07 Discuss the Industrial Revolution and the development of continuous manufacturing, sophisticated transportation and communication systems, advanced construction practices, and improved education and leisure time. STL.7.N, SS.A.5.4
07.08 Discuss the Information Age and its placement of emphasis on the processing and exchange of information. STL.7.O, SS.A.5.4

08.0 DEMONSTRATE AN UNDERSTANDING OF THE ATTRIBUTES OF DESIGN.--The student will be able to:

08.01 Describe the design process; including defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results. STL.8.H
08.02 Translate design problems that are seldom presented in a clearly defined form. STL.8.I, LA.D.1.4, LA.D.2.4
08.03 Evaluate a design continually, and improve and revise the idea of the design as needed. STL.8.J, SC.H.1.4
08.04 Analyze competing requirements of a design, such as criteria, constraints, and efficiency. STL.8.K, MA.A.3.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.D.1.4, MA.D.2.4, MA.E.1.4

09.0 DEMONSTRATE AN UNDERSTANDING OF ENGINEERING DESIGN.--The student will be able to:

09.01 Investigate design principles used to evaluate existing designs, to collect data, and to guide the design process. STL.9.I

09.02 Examine the influence of personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly on the Engineering Design process. STL.9.J, LA.D.1.4, SC.H.1.4

09.03 Construct a prototype or a working model used to test a design concept by making actual observations and necessary adjustments. STL.9.K, MA.B.1.4, SC.H.1.4, SC.H.3.4

09.04 Evaluate factors taken into account in the process of engineering. STL.9.L

10.0 DEMONSTRATE AN UNDERSTANDING OF THE ROLE OF TROUBLESHOOTING, RESEARCH AND DEVELOPMENT, INVENTION AND INNOVATION, AND EXPERIMENTATION IN PROBLEM SOLVING.--The student will be able to:

10.01 Employ research and development as a specific problem solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace. STL.10.I

10.02 Conduct research needed to solve technological problems. STL.10.J, LA.A.1.4, LA.A.2.4

10.03 Differentiate between technological and non-technological problems, and identify which problems can be solved using technology. STL.10.K, SC.H.1.4

10.04 Utilize a multidisciplinary approach to solving technological problems. STL.10.L, MA.A.1.4, MA.A.3.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.E.1.4, MA.E.3.4, SC.H.1.4, SC.H.3.4

11.0 DEMONSTRATE THE ABILITIES TO APPLY THE DESIGN PROCESS.--The student will be able to:

11.01 Interpret the design problem to solve and decide whether or not to address it. STL.11.M, SC.H.1.4

11.02 Evaluate criteria and constraints and determine how these will affect the design process. STL.11.N, MA.A.3.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.D.1.4, MA.D.2.4, MA.E.1.4, SC.H.1.4, SC.H.3.4

11.03 Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product. STL.11.0, SC.H.3.4

11.04 Evaluate the design solution using conceptual, physical, and mathematical models at various intervals of the design process in order to check for proper design and to note areas where improvements are needed. STL.11.P, MA.A.4.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, SC.H.1.4, SC.H.3.4

11.05 Produce a product or system using a design process. STL.11.Q

11.06 Evaluate final solutions and communicate observations, processes, and results of the entire design process, using verbal, graphic, quantitative, virtual, and written means, in addition to three-dimensional models. STL.11.R, LA.B.2.4, LA.C.3.4, MA.B.4.4, MA.D.2.4, MA.E.1.4, MA.E.2.4, MA.E.3.4, SC.H.1.4, SC.H.3.4

12.0 DEMONSTRATE THE ABILITIES TO USE AND MAINTAIN TECHNOLOGICAL PRODUCTS AND SYSTEMS.--The student will be able to:

12.01 Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques. STL.12.L, LA.B.2.4, LA.B.1.4, LA.C.3.4

12.02 Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it. STL.12.M
12.03 Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision. STL.12.N
12.04 Operate systems so that they function in the way they were designed. STL.12.O
12.05 Use computers and calculators to access, retrieve, organize, process, maintain, interpret, and evaluate data and information in order to communicate. STL.12.P, LA.A.2.4, MA.E.1.4

13.0 DEMONSTRATE THE ABILITIES TO ASSESS THE IMPACT OF PRODUCTS AND SYSTEMS.--The student will be able to:

13.01 Collect information and evaluate its quality. STL.13.J, LA.A.2.4, SC.H.1.4
13.02 Synthesize data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and the environment. STL.13.K, LA.A.2.4, SC.G.1.4, SC.G.2.4, SC.H.1.4
13.03 Apply assessment techniques, such as trend analysis and experimentation to make decisions about the future development of technology. STL.13.L, LA.A.2.4, MA.E.1.4, MA.E.2.4, MA.E.3.4
13.04 Design forecasting techniques to evaluate the results of altering natural systems. STL.13.M, MA.E.3.4, SC.G.2.4

14.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE MEDICAL TECHNOLOGIES.--The student will be able to:

14.01 Classify medical technologies including prevention and rehabilitation, vaccines and pharmaceuticals, medical and surgical procedures, genetic engineering, and the systems within which health is protected and maintained. (STL 14.K)
14.02 Discuss telemedicine and its convergence of technological advances in a number of fields, including medicine, virtual presence, computer engineering, informatics, artificial intelligence, robotics, materials science, and perceptual psychology. (STL 14.L)
14.03 Explain how the sciences of biochemistry and molecular biology have made it possible to manipulate the genetic information found in living creatures. (STL 14.M)

15.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE AGRICULTURAL AND RELATED BIOTECHNOLOGIES.--The student will be able to:

15.01 Discuss agriculture, including a combination of businesses that use a wide array of products and systems to produce, process, and distribute food, fiber, fuel, chemical, and other useful products. STL.15.K
15.02 Identify biotechnology applications in such areas as agriculture, pharmaceuticals, food and beverages, medicine, energy, the environment, and genetic engineering. STL.15.L
15.03 Define conservation as the process of controlling soil erosion, reducing sediment in waterways, and improving water quality. STL.15.M
15.04 Apply engineering design processes to management of agricultural systems requiring knowledge of artificial ecosystems and the effects of technological development on flora and fauna. STL.15.N

16.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE ENERGY AND POWER TECHNOLOGIES.--The student will be able to:

16.01 Discuss how energy cannot be created nor destroyed; however, it can be converted from one form to another. STL.16.J
16.02 Categorize types of energy into major forms: thermal, radiant, electrical, mechanical, chemical, nuclear, and others. STL.16.K
16.03 Explain impossibility of building an engine to perform work that does not exhaust thermal energy to the surroundings. STL.16.L
16.04 Classify energy resources as renewable or nonrenewable. STL.16.M
16.05 Construct a power system having a source of energy, a process, and loads. STL.16.N

17.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE INFORMATION AND COMMUNICATION TECHNOLOGIES.--The student will be able to:

17.01 Discuss information and communication technologies including the inputs, processes, and outputs associated with sending and receiving information. STL.17.L
17.02 Classify information and communication systems that allow information to be transferred as human to human, human to machine, machine to human, or machine to machine. STL.17.M
17.03 Use information and communication systems to inform, persuade, entertain, control, manage, and educate. STL.17.N
17.04 Identify components of a communications system, including source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination. STL.17.0
17.05 Identify many ways to communicate information, such as graphic and electronic means. STL.17.P
17.06 Communicate technological knowledge and processes using symbols, measurement, conventions, icons, graphic images, and languages that incorporate a variety of visual, auditory, and tactile stimuli. STL.17.Q

18.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE TRANSPORTATION TECHNOLOGIES.--The student will be able to:

18.01 Analyze the vital role played by transportation in the operation of other technologies, such as manufacturing, construction, communication, health and safety, and agriculture. STL.18.J
18.02 Define intermodalism as the use of different modes of transportation, such as highways, railways, and waterways as part of an interconnected system that can move people and goods easily from one mode to another. STL.18.K
18.03 Discuss how transportation services and methods have led to a population that is regularly on the move. STL.18.L
18.04 Identify processes and innovative techniques involved in the design of intelligent and non-intelligent transportation systems. STL.18.M

19.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE MANUFACTURING TECHNOLOGIES.--The student will be able to:

19.01 Service products to keep them in good operating condition. STL.19.L

19.02 Classify materials based on their qualities as natural, synthetic, or mixed. STL.19.M
19.03 Classify goods as durable goods designed to operate for a long period of time, or non-durable goods designed to operate for a short period of time. STL.19.N
19.04 Identify and classify manufacturing systems into types, such as customized production, batch production, and continuous production. STL.19.0
19.05 Discuss the interchangeability of parts to increase the effectiveness of manufacturing processes. STL.19.P
19.06 Identify chemical technologies providing a means for humans to alter or modify materials and to produce chemical products. STL.19.Q
19.07 Employ marketing techniques involving establishing a product's identity, conducting research on its potential, advertising it, distributing it, and selling it. STL.19.R

20.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE CONSTRUCTION TECHNOLOGIES.--The student will be able to:

20.01 Define infrastructure as the underlying base or basic framework of a system. STL.20.J
20.02 Identify a variety of processes and procedures used in constructing structures. STL.20.K
20.03 Identify requirements involved in the design of structures. STL.20.L
20.04 Recommend maintenance, alterations, or renovations to improve a structure or alter its intended use. STL.20.M
20.05 Identify prefabricated materials used in some structures. STL.20.N

21.0 DEMONSTRATE THE ABILITY TO WORK SAFELY WITH A VARIETY OF TECHNOLOGIES--The student will be able to:

21.01 Select appropriate tools, procedures, and/or equipment needed to produce a product.
21.02 Demonstrate the safe usage of appropriate tools, procedures, and operation of equipment needed to produce a product.
21.03 Demonstrate knowledge required to maintain and troubleshoot equipment used in a variety of technological systems.
21.04 Follow laboratory safety rules and procedures.
21.05 Demonstrate good housekeeping at work station within total laboratory.
21.06 Identify color-coding safety standards.
21.07 Explain fire prevention and safety precautions and practices for extinguishing fires.
21.08 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.

22.0 DEMONSTRATE INTERPERSONAL SKILLS AS THEY RELATE TO THE WORKPLACE--The student will be able to:

22.01 Perform roles in a student personnel system or in the Florida Technology Student Association (FL-TSA).
22.02 Participate as a member of a team.
22.03 Teach others new skills.
22.04 Identify skills needed to serve clients/customers.

22.05 Demonstrate leadership skills.
22.06 Describe strategies necessary for negotiating agreements.
22.07 Demonstrate the application of skills necessary to work with people of diverse backgrounds.
22.08 Form an understanding and appreciation for work after listening to or observing technology workers.
22.09 Form an understanding and appreciation for work after participating in a simulated technology group project in the laboratory.
22.10 Form an understanding and appreciation for the roles and work of co-workers.

23.0 IDENTIFY AND APPLY METHODS OF INFORMATION ACQUISITION AND UTILIZATIONS--The student will be able to:

23.01 Define terms related to computers.
23.02 Identify and describe methods of information acquisition and evaluation.
23.03 Discuss advantages and disadvantages in the application of technologies.
23.04 Produce a plan to organize and maintain information relevant to emerging technologies.
23.05 Comprehend and communicate information relevant to emerging technologies.
23.06 Demonstrate the use of computers to process information.

24.0 APPLY BASIC SKILLS IN COMMUNICATIONS, MATHEMATICS, AND SCIENCE APPROPRIATE TO TECHNOLOGICAL CONTENT AND LEARNING ACTIVITIES--The student will be able to:

24.01 Identify and explain the main and subordinate ideas in a written work.
24.02 Distinguish different purposes and methods of writing, identify a writer's point of view and tone, and interpret a writer's meaning.
24.03 Define unfamiliar words by use of structural analysis, decoding, contextual clues, or by using a dictionary.
24.04 Distinguish fact from opinion.
24.05 Read critically by asking pertinent questions, by recognizing assumptions and implications, and by evaluating ideas.
24.06 Select, relate, and organize, ideas using outlining and/or graphic organizers and develop the ideas in coherent paragraphs.
24.07 Improve one's own writing by restructuring, correcting errors, and rewriting.
24.08 Gather and organize information from primary and secondary sources; write a report using this research; quote, paraphrase, and summarize accurately; and cite sources properly.
24.09 Vary one's writing style, including vocabulary and sentence structure, for different readers and purposes.
24.10 Write logical and understandable statements, or phrases, to accurately fill out commonly used forms.
24.11 Compose unified and coherent correspondence, directions, descriptions, explanations and reports.
24.12 Participate critically and constructively in the exchange of ideas, particularly during class discussions and conferences with instructors.

24.13 Conceive and develop ideas about a topic for the purpose of speaking to a group; choose and organize related ideas; present them clearly in Standard English; and evaluate similar presentations by others.
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24.15 Make estimates and approximations, and judge the reasonableness of a result.
24.16 Use elementary concepts of probability and statistics.
24.17 Draw, read, and analyze graphs, charts, and tables.
24.18 Ask appropriate scientific questions and recognize what is involved in experimental approaches to the solutions of such questions through familiarity with laboratory and field work.
24.19 Organize and communicate the results obtained by observation and experimentation.
24.20 Apply the basic principles of biology, physics, and chemistry (properties of matter; structure of compounds; concepts of motion; temperature, pressure and volume; work, power, force and energy; machines; human cell structure).
24.21 Identify problems rooted in basic biology, physics, or chemistry (effects of hazardous materials on health and safety, effects of drugs on health, trouble shooting problems on a machine).

25.0 DEMONSTRATE AND APPLY DESIGN/PROBLEM-SOLVING PROCESSES--The student will be able to:

25.01 Describe and explain steps in the design/problem-solving process.
25.02 Propose solutions to given problems.
25.03 Design and implement the optimal solution to a given problem.
25.04 Document each step of the design/problem-solving process.
25.05 Demonstrate "brainstorming" as a process to solve problems.
25.06 Define "critical thinking" and its value in the problem-solving process.

26.0 EXPRESS AN UNDERSTANDING OF TECHNOLOGICAL SYSTEMS AND THEIR COMPLEX INTERRELATIONSHIPS--The student will be able to:

26.01 Demonstrate knowledge of how social, organizational, and technological systems work.
26.02 Explore methods used to monitor and correct performance of technological systems.
26.03 Design and implement an optimal solution to a given problem.
26.04 Outline major historical technological developments or events.
26.05 Identify recent advances in technology.
26.06 Explain problem-solving roles of technology.
26.07 Forecast a technological development or event.
26.08 Define technology.

27.0 DEMONSTRATE THE ABILITY TO PROPERLY IDENTIFY, ORGANIZE, PLAN, AND ALLOCATE RESOURCES--The student will be able to:

27.01 Demonstrate the ability to select goal-relevant activities, rank them, allocate time, and prepare and follow schedules.

27.02 Use or prepare budgets, make forecasts, keep records, and make adjustments to meet objectives.
27.03 Demonstrate the ability to acquire, store, allocate, and use materials or space efficiently.
27.04 Display knowledge of the efficient use of human resources.

28.0 DISCUSS INDIVIDUAL INTERESTS AND APTITUDES AS THEY RELATE TO A CAREER--The student will be able to:

28.01 Describe individual strengths and weaknesses.
28.02 Discuss individual interests related to a career.
28.03 Identify careers within specific areas of technology.
28.04 Explore careers within specific areas of interest.

29.0 DEMONSTRATE EMPLOYABILITY SKILLS--The student will be able to:

29.01 Conduct a job search.
29.02 Secure information about a career.
29.03 Identify documents that may be required when applying for a job interview.
29.04 Complete a job application form correctly.
29.05 Demonstrate competence in job interview techniques.
29.06 Prepare a resume for a job.

30.0 DEMONSTRATE AN UNDERSTANDING OF ENTREPRENEURSHIP--The student will be able to:

30.01 Define entrepreneurship.
30.02 Describe the importance of entrepreneurship to the American economy.
30.03 List the advantages and disadvantages of business ownership.
30.04 Identify the risks involved in ownership of a business.
30.05 Identify the necessary personal characteristics of a successful entrepreneur.
30.06 Identify the business skills needed to operate a small business efficiently and effectively.

31.0 MAKE AN INFORMED AND MEANINGFUL CAREER CHOICE--The student will be able to:

31.01 Make a tentative occupational choice based on the information learned and interest developed in this course.
31.02 Review tentative occupational choices based on the information learned and interest developed in this course.

37.0 DEMONSTRATE KNOWLEDGE OF THE BASIC PRINCIPLES OF TECHNOLOGY, THE BASIC ELEMENTS OF ALL SYSTEMS, AND THE COMPONENTS OF EACH BASIC ELEMENT--The student will be able to:

37.01 Define the six basic principles of technology: force, work, rate, resistance, energy, and power.
37.02 Name and define the three basic elements of all systems.
37.03 Name components of the three basic elements of a systems.
37.04 Name the six basic parts of the energy system.
37.05 State the function of each of the basic parts of the energy system.

37.06 Name and explain the functions of the four common working energy systems: mechanical, electrical, fluid, and thermal.

38.0 DEMONSTRATE KNOWLEDGE AND PERFORM SPECIAL SKILLS UNIQUE TO THE PHYSICAL TECHNOLOGIES--The student will be able to:

38.01 Define the function of construction technology, energy and power technology, manufacturing technology, and transportation technology.
38.02 Describe three careers for each of the physical technologies identified in 18.01.
38.03 Identify and demonstrate the tools, processes, and materials used in construction technology.
38.04 Identify and demonstrate the equipment, processes, and materials used in energy and power technology for converting and transmitting power.
38.05 Identify and demonstrate the tools, process, and materials used in manufacturing technology to perform computer-aided manufacturing.
38.06 Identify and demonstrate various ways that people and goods are transported.
38.07 Demonstrate problem-solving skills relative to the physical technologies utilizing the techniques learned in the course.

39.0 DEMONSTRATE KNOWLEDGE AND PERFORM SPECIAL SKILLS UNIQUE TO THE INFORMATION/COMMUNICATION TECHNOLOGIES--The student will be able to:
39.01 Define the function of information processing technology, graphic communication technology, and electronic communication technology.
39.02 Describe three careers for each of the communications technologies identified in 19.01.
39.03 Identified and demonstrate the tools, processes and materials used in the information/communication technologies.
39.04 Compare and contrast different processes of communication technologies.
39.05 Demonstrate modern communication systems using sound and speech, symbols and codes, printed works, drawing and pictures.
39.06 Identify the function of information processing technology, graphic communication technology, and electronic communication technology.
39.07 Identify several telecommunication services.
39.08 Demonstrate problem-solving skills relative to the information communication technologies utilizing the techniques learned in this course.

40.0 DEMONSTRATE KNOWLEDGE AND PERFORM SPECIAL SKILLS UNIQUE TO THE BIOTECHNOLOGIES--The student will be able to:

40.01 Define the function of biotechnology, medical technology, food production technology, and agriculture technology.
40.02 Describe three careers for each of the technology areas in 20.01.
40.03 Explain the three areas into which modern biotechnology is divided.
40.04 Contrast the seven resources for biotechnology with other technologies.
40.05 Identify several impacts of biotechnology on society and the environment.

40.06 Identify the role of biotechnology in agriculture, food production, and medicine.
40.07 Identify and describe the processes used in biotechnology and the related areas of produce outputs.
40.08 Identify several outputs of biotechnology and their related biotechnologies.
40.09 Demonstrate problem-solving skills relative to biotechnology, or a related biotechnology utilizing the techniques learned in this course.

41.0 DEMONSTRATE KNOWLEDGE AND APPLICATION OF ROBOTICS TECHNOLOGY--The student will be able to:

41.01 Identify three types of robots.
41.02 State the function of effectors, sensors, controllers, and auxiliary parts in a robotics system.
41.03 Operate a robot using a teach pendant.
41.04 Program a robot using a computer to perform a specific task.
41.05 Explain three impacts of robotics on society.
41.06 Demonstrate problem-solving skills relative to robotics utilizing the techniques learned in this course.

42.0 DEMONSTRATE KNOWLEDGE AND APPLICATION OF PROGRAMMABLE CONTROLLER TECHNOLOGY--The student will be able to:

42.01 State the function of the component parts of a programmable controller.
42.02 List several advantages of using programmable controllers.
42.03 Demonstrate logical continuity and branching functions with a programmable controller.

43.0 DEMONSTRATE KNOWLEDGE AND APPLICATION OF COMPUTER NUMERICAL CONTROL TECHNOLOGY--The student will be able to:

43.01 Demonstrate the technique of computer numerical control to perform and engraving and a milling activity.
43.02 Demonstrate problem-solving skills relative to computer numerical control utilizing the techniques learned in this course.

44.0 DEMONSTRATE KNOWLEDGE AND APPLICATION OF COMPUTER-AIDED DRAFTING TECHNOLOGY--The student will be able to:

44.01 Compare and contrast computer-aided drafting with non-computer aided drafting in terms of speed consistency, neatness, and accuracy.
44.02 Demonstrate the application of a computer and software program in doing several computer-aided drawings.
44.03 Identify computer-aided drafting hardware.
44.04 Demonstrate program-solving skills relative to computer-aided drafting utilizing the techniques learned in this course.

45.0 DEMONSTRATE KNOWLEDGE AND APPLICATION OF LASER TECHNOLOGY--The student will be able to:

45.01 Describe five applications of lasers.
45.02 Perform laser experiments demonstrating knowledge of:
- Characteristics of laser light.

- Characteristics of light waves.

45.03 List the safety precautions that one observes when working with a laser.

45.04 Assemble, operate and identify the parts of a laser optics system.

45.05 Demonstrate the use of a laser to do measurements, transmit data, and monitor.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8601710
Course Title: Technology Studies III
Course Credit: 1

COURSE DESCRIPTION: This program provides students with an advanced understanding of the knowledge, human relations, and technological skills found today in technical professions.

01.0 DEMONSTRATE AN UNDERSTANDING OF THE CHARACTERISTICS AND SCOPE OF TECHNOLOGY.--The student will be able to:

01.01 Discuss the nature and development of technological knowledge and processes. STL.1.J, LA.B.2.4, LA.C.3.4, SC.H.3.4
01.02 Graph the rapid increase in the rate of technological development and diffusion. STL.1.K, LA.B.2.4, LA.D.2.4, MA.B.1.4
01.03 Conduct specific goal-directed research related to inventions and innovations. STL.1.L, LA.A.1.4, LA.A.2.4, LA.B.2.4
01.04 Evaluate current technological developments that are/were driven by profit motive and the market. STL.1.M, SS.D.1.4

02.0 DEMONSTRATE AN UNDERSTANDING OF THE CORE CONCEPTS OF TECHNOLOGY.--The student will be able to:

02.01 Apply systems thinking logic and creativity with appropriate compromises in complex real-life problems. STL.2.W
02.02 Assess technological systems, which are the building blocks of technology and are embedded within larger technological, social, and environmental systems. STL.2.X, LA.D.2.4
02.03 Assess the stability of a technological system and its influence by all of the components in the system, especially those in the feedback loop. STL.2.Y
02.04 Compare resources involving trade-offs between competing values, such as availability, cost, desirability, and waste. STL.2.Z, SS.D.1.4
02.05 Identify the criteria and constraints of a product or system and then determine how they affect the final design and development. STL.2.AA, MA.A.5.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.E.3.4, SC.H.1.4
02.06 Propose strategies for optimizing a technological process or methodology of designing or making a product, dependent on criteria and constraints. STL.2.BB
02.07 Discuss new technologies that create new processes. STL.2.CC
02.08 Recommend a quality control process to ensure that a product, service or system meets established criteria. STL.2.DD
02.09 Organize a management system as the process of planning, organizing, and controlling work. STL.2.EE
02.10 Outline complex systems that have many layers of controls and feedback loops to provide information. STL.2.FF

03.0 DEMONSTRATE AN UNDERSTANDING OF THE RELATIONSHIPS AMONG TECHNOLOGIES AND THE CONNECTION BETWEEN TECHNOLOGY AND OTHER FIELDS OF STUDY. --The student will be able to:

03.01 Create technology transfer occurring when a new user applies an existing innovation developed for one purpose in a different function. STL.3.G, SC.H.3.4
03.02 Examine technological innovation resulting when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields. STL.3.H, SC.H.3.4
03.03 Report the process of patenting to protect a technological idea. STL.3.I
03.04 Investigate technological progresses that promote the advancement of science and mathematics. STL.3.J, LA.A.1.4, LA.B.1.4, SC.H.3.4

04.0 DEMONSTRATE AN UNDERSTANDING OF THE CULTURAL, SOCIAL, ECONOMIC, AND POLITICAL EFFECTS OF TECHNOLOGY.--The student will be able to:

04.01 Discuss changes caused by the use of technology ranging from gradual to rapid and from subtle to obvious. STL.4.H
04.02 Evaluate the use of technology involving weighing the trade-offs between the positive and the negative effects. STL.4.I, LA.B.2.4
04.03 Discuss ethical considerations important in the development, selection, and use of technologies. STL.4.J, SC.H.1.4, SS.C.2.4
04.04 Debate the cultural, social, economic, and political changes caused by the transfer of a technology from one society to another. STL.4.K, LA.B.2.4, LA.E.1.4, SC.H.3.4

05.0 DEMONSTRATE AN UNDERSTANDING OF THE EFFECTS OF TECHNOLOGY ON THE ENVIRONMENT.--The student will be able to:

05.01 Devise technologies to conserve water, soil, and energy through such techniques as reusing, reducing and recycling. STL.5.G, SC.G.1.4, SC.G.2.4, SS.B.2.4
05.02 Consider trade-offs of developing technologies to reduce the use of resources. STL.5.H, SC.G.2.4, SS.D.1.4
05.03 Use technology to monitor the environment and provide information as a basis for decision-making. STL.5.I, SC.H.3.4
05.04 Compare and contrast the alignment of technological processes with natural processes to maximize performance and reduce negative impacts on the environment. STL.5.J, SC.G.2.4, SS.B.2.4
05.05 Assess technologies devised to reduce the negative consequences of other technologies. STL.5.K
05.06 Make decisions about the implementation of technologies involving the weighing of trade-offs between predicted positive and negative effects on the environment. STL.5.L, SC.G.2.4, SC.H.3.4

06.0 DEMONSTRATE AN UNDERSTANDING OF THE ROLE OF SOCIETY IN THE DEVELOPMENT AND USE OF TECHNOLOGY.--The student will be able to:

06.01 Report how different cultures develop their own technologies to satisfy their individual and shared needs, wants, and values. STL.6.H, LA.D.2.4, SS.B.2.4
06.02 Consider societal opinions and demands, as well as corporate cultures to use as a basis for deciding whether or not to develop a technology. STL.6.I

06.03 Evaluate a number of different factors, such as advertising, the strength of the economy, the goals of a company, and the latest fads as contributors to shaping the design of and demand for various technologies. STL.6.J, LA.D.2.4, SS.A.1.4, SS.D.2.4

07.0 DEMONSTRATE AN UNDERSTANDING OF THE INFLUENCE OF TECHNOLOGY ON HISTORY.--The student will be able to:

07.01 Assess how the evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools and materials. STL.7.H, LA.A.1.4, LA.A.2.4, LA.B.2.4, SC.H.3.4, SS.A.2.4
07.02 Research the history of technology as a powerful force in reshaping the social, cultural, political, and economic landscape. STL.7.I, LA.D.2.4, SS.A.2.4
07.03 Debate that early in the history of technology, the development of many tools and machines was based not on scientific knowledge but on technological know-how. STL.7.J, SS.A.1.4
07.04 Discuss the Iron Age as the use of iron and steel as the primary materials for tools. STL.7.K
07.05 Discuss the Middle Ages and its development of many technological devices that produced long-lasting effects on technology and society. STL.7.L, SS.A.2.4
07.06 Discuss the Renaissance, a time of rebirth of the arts and humanities, as an important development in the history of technology. STL.7.M, SS.A.3.4
07.07 Discuss the Industrial Revolution and the development of continuous manufacturing, sophisticated transportation and communication systems, advanced construction practices, and improved education and leisure time. STL.7.N, SS.A.5.4
07.08 Discuss the Information Age and its placement of emphasis on the processing and exchange of information. STL.7.O, SS.A.5.4

08.0 DEMONSTRATE AN UNDERSTANDING OF THE ATTRIBUTES OF DESIGN.--The student will be able to:

08.01 Implement the design process; including defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results. STL.8.H
08.02 Translate design problems that are seldom presented in a clearly defined form. STL.8.I, LA.D.1.4, LA.D.2.4
08.03 Evaluate a design continually, and improve and revise the idea of the design as needed. STL.8.J, SC.H.1.4
08.04 Analyze competing requirements of a design, such as criteria, constraints, and efficiency. STL.8.K, MA.A.3.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.D.1.4, MA.D.2.4, MA.E.1.4

09.0 DEMONSTRATE AN UNDERSTANDING OF ENGINEERING DESIGN.--The student will be able to:

09.01 Select design principles used to evaluate existing designs, to collect data, and to guide the design process. STL.9.I

09.02 Examine the influence of personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly on the Engineering Design process. STL.9.J, LA.D.1.4, SC.H.1.4

09.03 Construct a prototype or a working model used to test a design concept by making actual observations and necessary adjustments. STL.9.K, MA.B.1.4, SC.H.1.4, SC.H.3.4

09.04 Evaluate factors taken into account in the process of engineering. STL.9.L

10.0 DEMONSTRATE AN UNDERSTANDING OF THE ROLE OF TROUBLESHOOTING, RESEARCH AND DEVELOPMENT, INVENTION AND INNOVATION, AND EXPERIMENTATION IN PROBLEM SOLVING.--The student will be able to:

10.01 Employ research and development as a specific problem solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace. STL.10.I

10.02 Conduct research needed to solve technological problems. STL.10.J, LA.A.1.4, LA.A.2.4

10.03 Differentiate between technological and non-technological problems, and identify which problems can be solved using technology. STL.10.K, SC.H.1.4

10.04 Utilize a multidisciplinary approach to solving technological problems. STL.10.L, MA.A.1.4, MA.A.3.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.E.1.4, MA.E.3.4, SC.H.1.4, SC.H.3.4

11.0 DEMONSTRATE THE ABILITIES TO APPLY THE DESIGN PROCESS.--The student will be able to:

11.01 Interpret the design problem to solve and decide whether or not to address it. STL.11.M, SC.H.1.4

11.02 Evaluate criteria and constraints and determine how these will affect the design process. STL.11.N, MA.A.3.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.D.1.4, MA.D.2.4, MA.E.1.4, SC.H.1.4, SC.H.3.4

11.03 Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product. STL.11.0, SC.H.3.4

11.04 Evaluate the design solution using conceptual, physical, and mathematical models at various intervals of the design process in order to check for proper design and to note areas where improvements are needed. STL.11.P, MA.A.4.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, SC.H.1.4, SC.H.3.4

11.05 Produce a product or system using a design process. STL.11.Q

11.06 Evaluate final solutions and communicate observations, processes, and results of the entire design process, using verbal, graphic, quantitative, virtual, and written means, in addition to three-dimensional models. STL.11.R, LA.B.2.4, LA.C.3.4, MA.B.4.4, MA.D.2.4, MA.E.1.4, MA.E.2.4, MA.E.3.4, SC.H.1.4, SC.H.3.4

12.0 DEMONSTRATE THE ABILITIES TO USE AND MAINTAIN TECHNOLOGICAL PRODUCTS AND SYSTEMS.--The student will be able to:

12.01 Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques. STL.12.L, LA.B.2.4, LA.B.1.4, LA.C.3.4

12.02 Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it. STL.12.M
12.03 Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision. STL.12.N
12.04 Operate systems so that they function in the way they were designed. STL.12.O
12.05 Use computers and calculators to access, retrieve, organize, process, maintain, interpret, and evaluate data and information in order to communicate. STL.12.P, LA.A.2.4, MA.E.1.4

13.0 DEMONSTRATE THE ABILITIES TO ASSESS THE IMPACT OF PRODUCTS AND SYSTEMS.--The student will be able to:

13.01 Collect information and evaluate its quality. STL.13.J, LA.A.2.4, SC.H.1.4
13.02 Synthesize data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and the environment. STL.13.K, LA.A.2.4, SC.G.1.4, SC.G.2.4, SC.H.1.4
13.03 Apply assessment techniques, such as trend analysis and experimentation to make decisions about the future development of technology. STL.13.L, LA.A.2.4, MA.E.1.4, MA.E.2.4, MA.E.3.4
13.04 Design forecasting techniques to evaluate the results of altering natural systems. STL.13.M, MA.E.3.4, SC.G.2.4

14.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE MEDICAL TECHNOLOGIES.--The student will be able to:

14.01 Classify medical technologies including prevention and rehabilitation, vaccines and pharmaceuticals, medical and surgical procedures, genetic engineering, and the systems within which health is protected and maintained. (STL 14.K)
14.02 Discuss telemedicine and its convergence of technological advances in a number of fields, including medicine, virtual presence, computer engineering, informatics, artificial intelligence, robotics, materials science, and perceptual psychology. (STL 14.L)
14.03 Explain how the sciences of biochemistry and molecular biology have made it possible to manipulate the genetic information found in living creatures. (STL 14.M)

15.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE AGRICULTURAL AND RELATED BIOTECHNOLOGIES.--The student will be able to:

15.01 Discuss agriculture, including a combination of businesses that use a wide array of products and systems to produce, process, and distribute food, fiber, fuel, chemical, and other useful products. STL.15.K
15.02 Identify biotechnology applications in such areas as agriculture, pharmaceuticals, food and beverages, medicine, energy, the environment, and genetic engineering. STL.15.L
15.03 Define conservation as the process of controlling soil erosion, reducing sediment in waterways, and improving water quality. STL.15.M
15.04 Apply engineering design processes to management of agricultural systems requiring knowledge of artificial ecosystems and the effects of technological development on flora and fauna. STL.15.N

16.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE ENERGY AND POWER TECHNOLOGIES.--The student will be able to:

16.01 Discuss how energy cannot be created nor destroyed; however, it can be converted from one form to another. STL.16.J
16.02 Categorize types of energy into major forms: thermal, radiant, electrical, mechanical, chemical, nuclear, and others. STL.16.K
16.03 Explain impossibility of building an engine to perform work that does not exhaust thermal energy to the surroundings. STL.16.L
16.04 Classify energy resources as renewable or nonrenewable. STL.16.M
16.05 Construct a power system having a source of energy, a process, and loads. STL.16.N

17.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE INFORMATION AND COMMUNICATION TECHNOLOGIES.--The student will be able to:

17.01 Discuss information and communication technologies including the inputs, processes, and outputs associated with sending and receiving information. STL.17.L
17.02 Classify information and communication systems that allow information to be transferred as human to human, human to machine, machine to human, or machine to machine. STL.17.M
17.03 Use information and communication systems to inform, persuade, entertain, control, manage, and educate. STL.17.N
17.04 Identify components of a communications system, including source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination. STL.17.0
17.05 Identify many ways to communicate information, such as graphic and electronic means. STL.17.P
17.06 Communicate technological knowledge and processes using symbols, measurement, conventions, icons, graphic images, and languages that incorporate a variety of visual, auditory, and tactile stimuli. STL.17.Q

18.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE TRANSPORTATION TECHNOLOGIES.--The student will be able to:

18.01 Analyze the vital role played by transportation in the operation of other technologies, such as manufacturing, construction, communication, health and safety, and agriculture. STL.18.J
18.02 Define intermodalism as the use of different modes of transportation, such as highways, railways, and waterways as part of an interconnected system that can move people and goods easily from one mode to another. STL.18.K
18.03 Discuss how transportation services and methods have led to a population that is regularly on the move. STL.18.L
18.04 Identify processes and innovative techniques involved in the design of intelligent and non-intelligent transportation systems. STL.18.M

19.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE MANUFACTURING TECHNOLOGIES.--The student will be able to:

19.01 Service products to keep them in good operating condition. STL.19.L

19.02 Classify materials based on their qualities as natural, synthetic, or mixed. STL.19.M
19.03 Classify goods as durable goods designed to operate for a long period of time, or non-durable goods designed to operate for a short period of time. STL.19.N
19.04 Identify and classify manufacturing systems into types, such as customized production, batch production, and continuous production. STL.19.0
19.05 Discuss the interchangeability of parts to increase the effectiveness of manufacturing processes. STL.19.P
19.06 Identify chemical technologies providing a means for humans to alter or modify materials and to produce chemical products. STL.19.Q
19.07 Employ marketing techniques involving establishing a product's identity, conducting research on its potential, advertising it, distributing it, and selling it. STL.19.R

20.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE CONSTRUCTION TECHNOLOGIES.--The student will be able to:

20.01 Define infrastructure as the underlying base or basic framework of a system. STL.20.J
20.02 Identify a variety of processes and procedures used in constructing structures. STL.20.K
20.03 Identify requirements involved in the design of structures. STL.20.L
20.04 Recommend maintenance, alterations, or renovations to improve a structure or alter its intended use. STL.20.M
20.05 Identify prefabricated materials used in some structures. STL.20.N

21.0 DEMONSTRATE THE ABILITY TO WORK SAFELY WITH A VARIETY OF TECHNOLOGIES--The student will be able to:

21.01 Select appropriate tools, procedures, and/or equipment needed to produce a product.
21.02 Demonstrate the safe usage of appropriate tools, procedures, and operation of equipment needed to produce a product.
21.03 Demonstrate knowledge required to maintain and troubleshoot equipment used in a variety of technological systems.
21.04 Follow laboratory safety rules and procedures.
21.05 Demonstrate good housekeeping at work station within total laboratory.
21.06 Identify color-coding safety standards.
21.07 Explain fire prevention and safety precautions and practices for extinguishing fires.
21.08 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.

22.0 DEMONSTRATE INTERPERSONAL SKILLS AS THEY RELATE TO THE WORKPLACE--The student will be able to:

22.01 Perform roles in a student personnel system or in the Florida Technology Student Association (FL-TSA).
22.02 Participate as a member of a team.
22.03 Teach others new skills.
22.04 Identify skills needed to serve clients/customers.

22.05 Demonstrate leadership skills.
22.06 Describe strategies necessary for negotiating agreements.
22.07 Demonstrate the application of skills necessary to work with people of diverse backgrounds.
22.08 Form an understanding and appreciation for work after listening to or observing technology workers.
22.09 Form an understanding and appreciation for work after participating in a simulated technology group project in the laboratory.
22.10 Form an understanding and appreciation for the roles and work of co-workers.

23.0 IDENTIFY AND APPLY METHODS OF INFORMATION ACQUISITION AND UTILIZATIONS--The student will be able to:

23.01 Define terms related to computers.
23.02 Identify and describe methods of information acquisition and evaluation.
23.03 Discuss advantages and disadvantages in the application of technologies.
23.04 Produce a plan to organize and maintain information relevant to emerging technologies.
23.05 Comprehend and communicate information relevant to emerging technologies.
23.06 Demonstrate the use of computers to process information.

24.0 APPLY BASIC SKILLS IN COMMUNICATIONS, MATHEMATICS, AND SCIENCE APPROPRIATE TO TECHNOLOGICAL CONTENT AND LEARNING ACTIVITIES--The student will be able to:

24.01 Identify and explain the main and subordinate ideas in a written work.
24.02 Distinguish different purposes and methods of writing, identify a writer's point of view and tone, and interpret a writer's meaning.
24.03 Define unfamiliar words by use of structural analysis, decoding, contextual clues, or by using a dictionary.
24.04 Distinguish fact from opinion.
24.05 Read critically by asking pertinent questions, by recognizing assumptions and implications, and by evaluating ideas.
24.06 Select, relate, and organize, ideas using outlining and/or graphic organizers and develop the ideas in coherent paragraphs.
24.07 Improve one's own writing by restructuring, correcting errors, and rewriting.
24.08 Gather and organize information from primary and secondary sources; write a report using this research; quote, paraphrase, and summarize accurately; and cite sources properly.
24.09 Vary one's writing style, including vocabulary and sentence structure, for different readers and purposes.
24.10 Write logical and understandable statements, or phrases, to accurately fill out commonly used forms.
24.11 Compose unified and coherent correspondence, directions, descriptions, explanations and reports.
24.12 Participate critically and constructively in the exchange of ideas, particularly during class discussions and conferences with instructors.

24.13 Conceive and develop ideas about a topic for the purpose of speaking to a group; choose and organize related ideas; present them clearly in Standard English; and evaluate similar presentations by others.
24.14 Use the mathematics of:
- integers, fractions, and decimals;
- ratios, proportions, and percentages;
- roots and powers;
- algebra;
- geometry.
24.15 Make estimates and approximations, and judge the reasonableness of a result.
24.16 Use elementary concepts of probability and statistics.
24.17 Draw, read, and analyze graphs, charts, and tables.
24.18 Ask appropriate scientific questions and recognize what is involved in experimental approaches to the solutions of such questions through familiarity with laboratory and field work.
24.19 Organize and communicate the results obtained by observation and experimentation.
24.20 Apply the basic principles of biology, physics, and chemistry (properties of matter; structure of compounds; concepts of motion; temperature, pressure and volume; work, power, force and energy; machines; human cell structure).
24.21 Identify problems rooted in basic biology, physics, or chemistry (effects of hazardous materials on health and safety, effects of drugs on health, trouble shooting problems on a machine).

25.0 DEMONSTRATE AND APPLY DESIGN/PROBLEM-SOLVING PROCESSES--The student will be able to:

25.01 Describe and explain steps in the design/problem-solving process.
25.02 Propose solutions to given problems.
25.03 Design and implement the optimal solution to a given problem.
25.04 Document each step of the design/problem-solving process.
25.05 Demonstrate "brainstorming" as a process to solve problems.
25.06 Define "critical thinking" and its value in the problem-solving process.

26.0 EXPRESS AN UNDERSTANDING OF TECHNOLOGICAL SYSTEMS AND THEIR COMPLEX INTERRELATIONSHIPS--The student will be able to:

26.01 Demonstrate knowledge of how social, organizational, and technological systems work.
26.02 Explore methods used to monitor and correct performance of technological systems.
26.03 Design and implement an optimal solution to a given problem.
26.04 Outline major historical technological developments or events.
26.05 Identify recent advances in technology.
26.06 Explain problem-solving roles of technology.
26.07 Forecast a technological development or event.
26.08 Define technology.

27.0 DEMONSTRATE THE ABILITY TO PROPERLY IDENTIFY, ORGANIZE, PLAN, AND ALLOCATE RESOURCES--The student will be able to:

27.01 Demonstrate the ability to select goal-relevant activities, rank them, allocate time, and prepare and follow schedules.

27.02 Use or prepare budgets, make forecasts, keep records, and make adjustments to meet objectives.
27.03 Demonstrate the ability to acquire, store, allocate, and use materials or space efficiently.
27.04 Display knowledge of the efficient use of human resources.

28.0 DISCUSS INDIVIDUAL INTERESTS AND APTITUDES AS THEY RELATE TO A CAREER--The student will be able to:

28.01 Describe individual strengths and weaknesses.
28.02 Discuss individual interests related to a career.
28.03 Identify careers within specific areas of technology.
28.04 Explore careers within specific areas of interest.

29.0 DEMONSTRATE EMPLOYABILITY SKILLS--The student will be able to:

29.01 Conduct a job search.
29.02 Secure information about a career.
29.03 Identify documents that may be required when applying for a job interview.
29.04 Complete a job application form correctly.
29.05 Demonstrate competence in job interview techniques.
29.06 Prepare a resume for a job.

30.0 DEMONSTRATE AN UNDERSTANDING OF ENTREPRENEURSHIP--The student will be able to:

30.01 Define entrepreneurship.
30.02 Describe the importance of entrepreneurship to the American economy.
30.03 List the advantages and disadvantages of business ownership.
30.04 Identify the risks involved in ownership of a business.
30.05 Identify the necessary personal characteristics of a successful entrepreneur.
30.06 Identify the business skills needed to operate a small business efficiently and effectively.

31.0 MAKE AN INFORMED AND MEANINGFUL CAREER CHOICE--The student will be able to:

31.01 Make a tentative occupational choice based on the information learned and interest developed in this course.
31.02 Review tentative occupational choices based on the information learned and interest developed in this course.

46.0 DEMONSTRATE KNOWLEDGE AND APPLICATION OF MECHANICAL SYSTEMS--The student will be able to:

46.01 Define the concepts of force, work, rate, resistance, energy and power as they relate to mechanical systems.
46.02 Diagram a mechanical system incorporating input, monitoring, controlling, output, and feedback.
46.03 Report on the six simple machines.
46.04 Identify various parts of a mechanical system.
46.05 Assemble and operate the six simple machines.

46.06 Use the problem-solving model - perform activities using combinations of the six simple machines to meet the described design criteria.
46.07 Demonstrate the use of a computer to control a mechanical system.

47.0 DEMONSTRATE KNOWLEDGE AND APPLICATION OF FLUID SYSTEMS--The student will be able to:

47.01 Define the concepts of force, work rate, resistance, energy and power as they relate to fluid systems.
47.02 Diagram a fluid system incorporating input, monitoring, controlling, output, and feedback.
47.03 Diagram a fluid power system incorporating input, monitoring, controlling, output, and feedback.
47.04 Use the problem-solving model - perform activities using fluid power components to meet the described design criteria.
47.05 Assemble, operate, and identify the parts of a fluid power system.
47.06 Report on the applications of fluid power used in technology.
47.07 Demonstrate the use of a computer to control a fluid power system.

48.0 DEMONSTRATE KNOWLEDGE AND APPLICATION OF ELECTRICAL SYSTEMS--The student will be able to:

48.01 Define the concepts of force, work, rate resistance, energy, and power as they relate to electrical systems.
48.02 Diagram an electrical system incorporating input, monitoring, controlling, output and feedback components.
48.03 Explain what a system and sub-system is.
48.04 Describe types of electrical outputs of heat, light, temperature, sound, magnetism, and electrical voltage.
48.05 Describe types of electrical inputs of light, temperature, sound, magnetism, moisture, movement, pressure, and voltage.
48.06 Use the problem-solving model - perform activities using electrical system components to meet the describe design criteria.
48.07 Demonstrate the use of a computer to control an electrical system.

49.0 DEMONSTRATE THE USE OF FIBER OPTICS--The student will be able to:

49.01 Report on the applications of fiber optics in technology.
49.02 Use the problem-solving model - perform activities using fiber optics to meet the described design criteria.
49.03 Assemble, operate, and identify the parts of a fiber optics system.

50.0 DEMONSTRATE THE USE OF A COMPUTER TO INTEGRATE AND CONTROL A SYSTEM COMPOSED OF MECHANICAL, FLUID AND ELECTRICAL SYSTEMS--The student will be able to:

50.01 Diagram an integrated system incorporating input, monitoring, controlling, output and feedback components.
50.02 Use the problem-solving model - perform activities using integrated systems to meet the described design criteria.
50.03 Assemble, operate, and identify the parts of integrated systems.

50.04 Demonstrate the use of a computer to control an integrated system composed of mechanical, fluid and electrical components.

51.0 CONDUCT A RESEARCH AND EXPERIMENTATION PROJECT ON A TECHNOLOGICAL MATERIAL OR PROCESS--The student will be able to:

51.01 Identify a problem.
51.02 State a need to research the problem.
51.03 Form a hypothesis about the problem.
51.04 Plan the procedures for researching the problem.
51.05 Conduct the research following the planned procedures.
51.06 Present the research findings in a seminar.
51.07 State conclusions based on the research findings.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8600120
Course Title: Foundations of Technology
Course Credit: 1

COURSE DESCRIPTION: This course will focus on the three dimensions of technological literacy: knowledge, ways of thinking and acting, and capabilities with the goal of students developing the characteristics of a technologically literate citizen. It will employ teaching/learning strategies that enable students to build their own understanding of new ideas. It is designed to engage students in exploring and deepening their understanding of "big ideas" regarding technology and makes use of a variety assessment instruments to reveal the extent of understanding.

Students will develop an understanding of the influence of technology on history by exploring how people of all times and places have increased their capability by using their unique skills to innovate, improvise and invent. They will gain an understanding of technology innovation and the fact that it often results when ideas, knowledge, or skills are shared within a technology, among technologies or across other fields of study. Students will develop an understanding of engineering design, the formal process that transforms ideas into products or systems of the designed world. They will select and use manufacturing technologies and understand that modern manufacturing technologies produce quality goods at low prices, enhancing the quality of life for many people. Students will select and use construction technologies and recognize that cultural norms, environmental conditions, and the requirements of enterprises and institutions impact the design of structures. Opportunities will be provided that enable students to select and use energy and power technologies and to explore the processing and controlling of the energy resources that have been important in the development of contemporary technology. They will become familiar with information and communications technologies and their role in maintaining competitive economic growth. The course will conclude with the synthesizing of major ideas through an understanding of the core concepts of technology with an emphasis on systems-thinking and related principles.

1.0 Demonstrate an understanding of the characteristics and scope of technology. The student will be able to:
- 01.05 Discuss the nature and development of technological knowledge and processes. STL.1.J, LA.B.2.4, LA.C.3.4, SC.H.3.4
- 01.06 Graph the rapid increase in the rate of technological development and diffusion. STL.1.K, LA.B.2.4, LA.D.2.4, MA.B.1.4
- 01.07 Conduct specific goal-directed research related to inventions and innovations. STL.1.L, LA.A.1.4, LA.A.2.4, LA.B.2.4
- 01.08 Evaluate current technological developments that are/were driven by profit motive and the market. STL.1.M, SS.D.1.4

2.0 Demonstrate an understanding of the core concepts of technology. The student will be able to:
- 02.11 Assess technological systems, which are the building blocks of technology and are embedded within larger technological, social, and environmental systems. STL.2.X, LA.D.2.4
- 02.12 Assess the stability of a technological system and its influence by all of the components in the system, especially those in the feedback loop. STL.2.Y

02.13 Compare resources involving trade-offs between competing values, such as availability, cost, desirability, and waste. STL.2.Z, SS.D.1.4
02.14 Discuss new technologies that create new processes. STL.2.CC

3.0 Demonstrate an understanding of the relationships among technologies and the connection between technology and other fields of study. The student will be able to:
03.05 Create technology transfer occurring when a new user applies an existing innovation developed for one purpose in a different function. STL.3.G, SC.H.3.4
03.06 Examine technological innovation resulting when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields. STL.3.H, SC.H.3.4
03.07 Report the process of patenting to protect a technological idea. STL.3.I
03.08 Investigate technological progresses that promote the advancement of science and mathematics. STL.3.J, LA.A.1.4, LA.B.1.4, SC.H.3.4

6.0 Demonstrate an understanding of the role of society in the development and use of technology. The student will be able to:
06.04 Evaluate a number of different factors, such as advertising, the strength of the economy, the goals of a company, and the latest fads as contributors to shaping the design of and demand for various technologies. STL.6.J, LA.D.2.4, SS.A.1.4, SS.D.2.4

7.0 Demonstrate an understanding of the influence of technology on history. The student will be able to:
07.09 Explain how most technological development has been evolutionary, the result of a series of refinements to a basic invention. STL.7.G
07.10 Debate that early in the history of technology, the development of many tools and machines was based not on scientific knowledge but on technological know-how. STL.7.J, SS.A.1.4
07.11 Discuss the Iron Age as the use of iron and steel as the primary materials for tools. STL.7.K
07.12 Discuss the Middle Ages and its development of many technological devices that produced long-lasting effects on technology and society. STL.7.L, SS.A.2.4
07.13 Discuss the Renaissance, a time of rebirth of the arts and humanities, as an important development in the history of technology. STL.7.M, SS.A.3.4
07.14 Discuss the Industrial Revolution and the development of continuous manufacturing, sophisticated transportation and communication systems, advanced construction practices, and improved education and leisure time. STL.7.N, SS.A.5.4
07.15 Discuss the Information Age and its placement of emphasis on the processing and exchange of information. STL.7.O, SS.A.5.4

8.0 Demonstrate an understanding of the attributes of design. The student will be able to:
08.05 Implement the design process; including defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a

model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results. STL.8.H

08.06 Translate design problems that are seldom presented in a clearly defined form. STL.8.I, LA.D.1.4, LA.D.2.4

08.07 Evaluate a design continually, and improve and revise the idea of the design as needed. STL.8.J, SC.H.1.4

08.08 Analyze competing requirements of a design, such as criteria, constraints, and efficiency. STL.8.K, MA.A.3.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.D.1.4, MA.D.2.4, MA.E.1.4

9.0 Demonstrate an understanding of the engineering design. The student will be able to:

09.05 Select design principles used to evaluate existing designs, to collect data, and to guide the design process. STL.9.I

09.06 Examine the influence of personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly on the Engineering Design process. STL.9.J, LA.D.1.4, SC.H.1.4

09.07 Construct a prototype or a working model used to test a design concept by making actual observations and necessary adjustments. STL.9.K, MA.B.1.4, SC.H.1.4, SC.H.3.4

09.08 Evaluate factors taken into account in the process of engineering. STL.9.L

10.0 Demonstrate an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving. The student will be able to:

10.05 Employ research and development as a specific problem solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace. STL.10.I

11.0 Demonstrate the abilities to apply the design process. The student will be able to:

11.07 Evaluate criteria and constraints and determine how these will affect the design process. STL.11.N, MA.A.3.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.D.1.4, MA.D.2.4, MA.E.1.4, SC.H.1.4, SC.H.3.4

11.08 Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product. STL.11.0, SC.H.3.4

11.09 Evaluate the design solution using conceptual, physical, and mathematical models at various intervals of the design process in order to check for proper design and to note areas where improvements are needed. STL.11.P, MA.A.4.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, SC.H.1.4, SC.H.3.4

11.10 Produce a product or system using a design process. STL.11.Q

11.11 Evaluate final solutions and communicate observations, processes, and results of the entire design process, using verbal, graphic, quantitative, virtual, and written means, in addition to three-dimensional models. STL.11.R, LA.B.2.4, LA.C.3.4, MA.B.4.4, MA.D.2.4, MA.E.1.4, MA.E.2.4, MA.E.3.4, SC.H.1.4, SC.H.3.4

12.0 Demonstrate the abilities to use and maintain technological products and systems. The student will be able to:

12.06 Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques. STL.12.L, LA.B.2.4, LA.B.1.4, LA.C.3.4
12.07 Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it. STL.12.M
12.08 Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision. STL.12.N
12.09 Operate systems so that they function in the way they were designed. STL.12.O
12.10 Use computers and calculators to access, retrieve, organize, process, maintain, interpret, and evaluate data and information in order to communicate. STL.12.P, LA.A.2.4, MA.E.1.4

13.0 Demonstrate the abilities to assess the impact of products and systems. The student will be able to:
13.05 Collect information and evaluate its quality. STL.13.J, LA.A.2.4, SC.H.1.4

14.0 Demonstrate an understanding of and be able to select and use medical technologies. The student will be able to:
14.04 Discuss telemedicine and its convergence of technological advances in a number of fields, including medicine, virtual presence, computer engineering, informatics, artificial intelligence, robotics, materials science, and perceptual psychology. (STL 14.L)

15.0 Demonstrate an understanding of and be able to select and use agricultural and related biotechnologies. The student will be able to:
15.05 Discuss agriculture, including a combination of businesses that use a wide array of products and systems to produce, process, and distribute food, fiber, fuel, chemical, and other useful products. STL.15.K

16.0 Demonstrate an understanding of and be able to select and use energy and power technologies. The student will be able to:
16.06 Discuss how energy cannot be created nor destroyed; however, it can be converted from one form to another. STL.16.J
16.07 Categorize types of energy into major forms: thermal, radiant, electrical, mechanical, chemical, nuclear, and others. STL.16.K
16.08 Classify energy resources as renewable or nonrenewable. STL.16.M
16.09 Construct a power system having a source of energy, a process, and loads. STL.16.N

17.0 Demonstrate an understanding of and be able to select and use information and communication technologies. The student will be able to:
17.07 Discuss information and communication technologies including the inputs, processes, and outputs associated with sending and receiving information. STL.17.L
17.08 Classify information and communication systems that allow information to be transferred as human to human, human to machine, machine to human, or machine to machine. STL.17.M
17.09 Use information and communication systems to inform, persuade, entertain, control, manage, and educate. STL.17.N
17.10 Identify components of a communications system, including source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination. STL.17.0

17.11 Communicate technological knowledge and processes using symbols, measurement, conventions, icons, graphic images, and languages that incorporate a variety of visual, auditory, and tactile stimuli. STL.17.Q

18.0 Demonstrate an understanding of and be able to select and use transportation technologies. The student will be able to:

18.05 Analyze the vital role played by transportation in the operation of other technologies, such as manufacturing, construction, communication, health and safety, and agriculture. STL.18.J

19.0 Demonstrate an understanding of and be able to select and use manufacturing technologies. The student will be able to:

19.08 Classify materials based on their qualities as natural, synthetic, or mixed. STL.19.M

19.09 Identify and classify manufacturing systems into types, such as customized production, batch production, and continuous production. STL.19.0

19.10 Discuss the interchangeability of parts to increase the effectiveness of manufacturing processes. STL.19.P

20.0 Demonstrate an understanding of and be able to select and use construction technologies. The student will be able to:

20.06 Define infrastructure as the underlying base or basic framework of a system. STL.20.J

20.07 Identify a variety of processes and procedures used in constructing structures. STL.20.K

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8600130
Course Title: Impacts of Technology
Course Credit: 1

COURSE DESCRIPTION: Students in *Impacts of Technology* learn that *technology* is a neutral topic that can have good or bad impacts on society. This *technology assessment* is a structured evaluation of the application of technology in an effort to avoid inappropriate or unwanted effects. Applying design and student imagination without considering the possible effects of new products or processes can lead to technological disasters, superfund sites, and unsafe products that could have been avoided in the initial design stages. Whether a new product, system, or process has an overall positive, neutral, or negative impact depends on the proper understanding of technology assessment. This aspect of Impacts of Technology gives students a head start on the road to technological literacy, by focusing primarily on *technology assessment* and the impact on *technology design.*

1.0 Demonstrate an understanding of the characteristics and scope of technology. The student will be able to:
- 01.01 Discuss the nature and development of technological knowledge and processes. STL.1.J, LA.B.2.4, LA.C.3.4, SC.H.3.4
- 01.02 Graph the rapid increase in the rate of technological development and diffusion. STL.1.K, LA.B.2.4, LA.D.2.4, MA.B.1.4
- 01.03 Conduct specific goal-directed research related to inventions and innovations. STL.1.L, LA.A.1.4, LA.A.2.4, LA.B.2.4

3.0 Demonstrate an understanding of the relationships among technologies and the connection between technology and other fields of study. The student will be able to:
- 03.01 Create technology transfer occurring when a new user applies an existing innovation developed for one purpose in a different function. STL.3.G, SC.H.3.4
- 03.02 Investigate technological progresses that promote the advancement of science and mathematics. STL.3.J, LA.A.1.4, LA.B.1.4, SC.H.3.4

4.0 Demonstrate an understanding of the cultural, social, economic, and political effects of technology. The student will be able to:
- 04.01 Discuss changes caused by the use of technology ranging from gradual to rapid and from subtle to obvious. STL.4.H
- 04.02 Evaluate the use of technology involving weighing the trade-offs between the positive and the negative effects. STL.4.I, LA.B.2.4
- 04.03 Discuss ethical considerations important in the development, selection, and use of technologies. STL.4.J, SC.H.1.4, SS.C.2.4
- 04.04 Debate the cultural, social, economic, and political changes caused by the transfer of a technology from one society to another. STL.4.K, LA.B.2.4, LA.E.1.4, SC.H.3.4

5.0 Demonstrate an understanding of the effects of technology on the environment. The student will be able to:
- 05.01 Consider trade-offs of developing technologies to reduce the use of resources. STL.5.H, SC.G.2.4, SS.D.1.4

05.02 Use technology to monitor the environment and provide information as a basis for decision-making. STL.5.I, SC.H.3.4
05.03 Compare and contrast the alignment of technological processes with natural processes to maximize performance and reduce negative impacts on the environment. STL.5.J, SC.G.2.4, SS.B.2.4
05.04 Assess technologies devised to reduce the negative consequences of other technologies. STL.5.K
05.05 Make decisions about the implementation of technologies involving the weighing of trade-offs between predicted positive and negative effects on the environment. STL.5.L, SC.G.2.4, SC.H.3.4

6.0 Demonstrate an understanding of the role of society in the development and use of technology. The student will be able to:
06.01 Report how different cultures develop their own technologies to satisfy their individual and shared needs, wants, and values. STL.6.H, LA.D.2.4, SS.B.2.4
06.02 Consider societal opinions and demands, as well as corporate cultures to use as a basis for deciding whether or not to develop a technology. STL.6.I
06.03 Evaluate a number of different factors, such as advertising, the strength of the economy, the goals of a company, and the latest fads as contributors to shaping the design of and demand for various technologies. STL.6.J, LA.D.2.4, SS.A.1.4, SS.D.2.4

7.0 Demonstrate an understanding of the influence of technology on history. The student will be able to:
07.01 Assess how the evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools and materials. STL.7.H, LA.A.1.4, LA.A.2.4, LA.B.2.4, SC.H.3.4, SS.A.2.4
07.02 Research the history of technology as a powerful force in reshaping the social, cultural, political, and economic landscape. STL.7.I, LA.D.2.4, SS.A.2.4
07.03 Discuss the Iron Age as the use of iron and steel as the primary materials for tools. STL.7.K
07.04 Discuss the Middle Ages and its development of many technological devices that produced long-lasting effects on technology and society. STL.7.L, SS.A.2.4
07.05 Discuss the Renaissance, a time of rebirth of the arts and humanities, as an important development in the history of technology. STL.7.M, SS.A.3.4
07.06 Discuss the Industrial Revolution and the development of continuous manufacturing, sophisticated transportation and communication systems, advanced construction practices, and improved education and leisure time. STL.7.N, SS.A.5.4
07.07 Discuss the Information Age and its placement of emphasis on the processing and exchange of information. STL.7.O, SS.A.5.4

10.0 Demonstrate an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving. The student will be able to:
10.01 Conduct research needed to solve technological problems. STL.10.J, LA.A.1.4, LA.A.2.4
10.02 Differentiate between technological and non-technological problems, and identify which problems can be solved using technology. STL.10.K, SC.H.1.4

11.0 Demonstrate the abilities to apply the design process. The student will be able to:
11.01 Interpret the design problem to solve and decide whether or not to address it. STL.11.M, SC.H.1.4

13.0 Demonstrate the abilities to assess the impact of products and systems. The student will be able to:
13.01 Collect information and evaluate its quality. STL.13.J, LA.A.2.4, SC.H.1.4
13.02 Synthesize data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and the environment. STL.13.K, LA.A.2.4, SC.G.1.4, SC.G.2.4, SC.H.1.4
13.03 Apply assessment techniques, such as trend analysis and experimentation to make decisions about the future development of technology. STL.13.L, LA.A.2.4, MA.E.1.4, MA.E.2.4, MA.E.3.4
13.04 Design forecasting techniques to evaluate the results of altering natural systems. STL.13.M, MA.E.3.4, SC.G.2.4

14.0 Demonstrate an understanding of and be able to select and use medical technologies. The student will be able to:
14.01 Classify medical technologies including prevention and rehabilitation, vaccines and pharmaceuticals, medical and surgical procedures, genetic engineering, and the systems within which health is protected and maintained. (STL 14.K)

15.0 Demonstrate an understanding of and be able to select and use agricultural and related biotechnologies. The student will be able to:
15.01 Identify biotechnology applications in such areas as agriculture, pharmaceuticals, food and beverages, medicine, energy, the environment, and genetic engineering. STL.15.L

16.0 Demonstrate an understanding of and be able to select and use energy and power technologies. The student will be able to:
16.01 Explain impossibility of building an engine to perform work that does not exhaust thermal energy to the surroundings. STL.16.L
16.02 Classify energy resources as renewable or nonrenewable. STL.16.M

17.0 Demonstrate an understanding of and be able to select and use information and communication technologies. The student will be able to:
17.01 Use information and communication systems to inform, persuade, entertain, control, manage, and educate. STL.17.N
17.02 Identify many ways to communicate information, such as graphic and electronic means. STL.17.P

18.0 Demonstrate an understanding of and be able to select and use transportation technologies. The student will be able to:
18.01 Define intermodalism as the use of different modes of transportation, such as highways, railways, and waterways as part of an interconnected system that can move people and goods easily from one mode to another. STL.18.K
18.02 Discuss how transportation services and methods have led to a population that is regularly on the move. STL.18.L

19.0 Demonstrate an understanding of and be able to select and use manufacturing technologies. The student will be able to:

19.01 Service products to keep them in good operating condition. STL.19.L
19.02 Classify materials based on their qualities as natural, synthetic, or mixed. STL.19.M
19.03 Identify chemical technologies providing a means for humans to alter or modify materials and to produce chemical products. STL.19.Q
19.04 Employ marketing techniques involving establishing a product's identity, conducting research on its potential, advertising it, distributing it, and selling it. STL.19.R

20.0 Demonstrate an understanding of and be able to select and use construction technologies. The student will be able to:
20.01 Recommend maintenance, alterations, or renovations to improve a structure or alter its intended use. STL.20.M

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8600140
Course Title: Introduction to Design
Course Credit: 1

COURSE DESCRIPTION:

1.0 Demonstrate an understanding of the characteristics and scope of technology. The student will be able to:
- 01.01 Discuss the nature and development of technological knowledge and processes. STL.1.J, LA.B.2.4, LA.C.3.4, SC.H.3.4
- 01.02 Graph the rapid increase in the rate of technological development and diffusion. STL.1.K, LA.B.2.4, LA.D.2.4, MA.B.1.4
- 01.03 Conduct specific goal-directed research related to inventions and innovations. STL.1.L, LA.A.1.4, LA.A.2.4, LA.B.2.4
- 01.04 Evaluate current technological developments that are/were driven by profit motive and the market. STL.1.M, SS.D.1.4

2.0 Demonstrate an understanding of the core concepts of technology. The student will be able to:
- 02.01 Apply systems thinking logic and creativity with appropriate compromises in complex real-life problems. STL.2.W
- 02.02 Assess technological systems, which are the building blocks of technology and are embedded within larger technological, social, and environmental systems. STL.2.X, LA.D.2.4
- 02.03 Assess the stability of a technological system and its influence by all of the components in the system, especially those in the feedback loop. STL.2.Y
- 02.04 Compare resources involving trade-offs between competing values, such as availability, cost, desirability, and waste. STL.2.Z, SS.D.1.4
- 02.05 Identify the criteria and constraints of a product or system and then determine how they affect the final design and development. STL.2.AA, MA.A.5.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.E.3.4, SC.H.1.4
- 02.06 Propose strategies for optimizing a technological process or methodology of designing or making a product, dependent on criteria and constraints. STL.2.BB
- 02.07 Discuss new technologies that create new processes. STL.2.CC
- 02.08 Recommend a quality control process to ensure that a product, service or system meets established criteria. STL.2.DD
- 02.09 Organize a management system as the process of planning, organizing, and controlling work. STL.2.EE
- 02.10 Outline complex systems that have many layers of controls and feedback loops to provide information. STL.2.FF

3.0 Demonstrate an understanding of the relationships among technologies and the connection between technology and other fields of study. The student will be able to:

03.01 Create technology transfer occurring when a new user applies an existing innovation developed for one purpose in a different function. STL.3.G, SC.H.3.4
03.02 Examine technological innovation resulting when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields. STL.3.H, SC.H.3.4
03.03 Report the process of patenting to protect a technological idea. STL.3.I
03.04 Investigate technological progresses that promote the advancement of science and mathematics. STL.3.J, LA.A.1.4, LA.B.1.4, SC.H.3.4

4.0 Demonstrate an understanding of the cultural, social, economic, and political effects of technology. The student will be able to:
04.01 Discuss changes caused by the use of technology ranging from gradual to rapid and from subtle to obvious. STL.4.H
04.02 Evaluate the use of technology involving weighing the trade-offs between the positive and the negative effects. STL.4.I, LA.B.2.4
04.03 Discuss ethical considerations important in the development, selection, and use of technologies. STL.4.J, SC.H.1.4, SS.C.2.4
04.04 Debate the cultural, social, economic, and political changes caused by the transfer of a technology from one society to another. STL.4.K, LA.B.2.4, LA.E.1.4, SC.H.3.4

5.0 Demonstrate an understanding of the effects of technology on the environment. The student will be able to:
05.01 Devise technologies to conserve water, soil, and energy through such techniques as reusing, reducing and recycling. STL.5.G, SC.G.1.4, SC.G.2.4, SS.B.2.4
05.02 Consider trade-offs of developing technologies to reduce the use of resources. STL.5.H, SC.G.2.4, SS.D.1.4
05.03 Use technology to monitor the environment and provide information as a basis for decision-making. STL.5.I, SC.H.3.4
05.04 Compare and contrast the alignment of technological processes with natural processes to maximize performance and reduce negative impacts on the environment. STL.5.J, SC.G.2.4, SS.B.2.4
05.05 Assess technologies devised to reduce the negative consequences of other technologies. STL.5.K
05.06 Make decisions about the implementation of technologies involving the weighing of trade-offs between predicted positive and negative effects on the environment. STL.5.L, SC.G.2.4, SC.H.3.4

6.0 Demonstrate an understanding of the role of society in the development and use of technology. The student will be able to:
06.01 Report how different cultures develop their own technologies to satisfy their individual and shared needs, wants, and values. STL.6.H, LA.D.2.4, SS.B.2.4
06.02 Consider societal opinions and demands, as well as corporate cultures to use as a basis for deciding whether or not to develop a technology. STL.6.I
06.03 Evaluate a number of different factors, such as advertising, the strength of the economy, the goals of a company, and the latest fads as contributors to shaping the design of and demand for various technologies. STL.6.J, LA.D.2.4, SS.A.1.4, SS.D.2.4

7.0 Demonstrate an understanding of the influence of technology on history. The student will be able to:

07.01 Assess how the evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools and materials. STL.7.H, LA.A.1.4, LA.A.2.4, LA.B.2.4, SC.H.3.4, SS.A.2.4

07.02 Research the history of technology as a powerful force in reshaping the social, cultural, political, and economic landscape. STL.7.I, LA.D.2.4, SS.A.2.4

07.03 Debate that early in the history of technology, the development of many tools and machines was based not on scientific knowledge but on technological know-how. STL.7.J, SS.A.1.4

07.04 Discuss the Iron Age as the use of iron and steel as the primary materials for tools. STL.7.K

07.05 Discuss the Middle Ages and its development of many technological devices that produced long-lasting effects on technology and society. STL.7.L, SS.A.2.4

07.06 Discuss the Renaissance, a time of rebirth of the arts and humanities, as an important development in the history of technology. STL.7.M, SS.A.3.4

07.07 Discuss the Industrial Revolution and the development of continuous manufacturing, sophisticated transportation and communication systems, advanced construction practices, and improved education and leisure time. STL.7.N, SS.A.5.4

07.08 Discuss the Information Age and its placement of emphasis on the processing and exchange of information. STL.7.O, SS.A.5.4

8.0 Demonstrate an understanding of the attributes of design. The student will be able to:

08.01 Implement the design process; including defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results. STL.8.H

08.02 Translate design problems that are seldom presented in a clearly defined form. STL.8.I, LA.D.1.4, LA.D.2.4

08.03 Evaluate a design continually, and improve and revise the idea of the design as needed. STL.8.J, SC.H.1.4

08.04 Analyze competing requirements of a design, such as criteria, constraints, and efficiency. STL.8.K, MA.A.3.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.D.1.4, MA.D.2.4, MA.E.1.4

9.0 Demonstrate an understanding of the engineering design. The student will be able to:

09.01 Select design principles used to evaluate existing designs, to collect data, and to guide the design process. STL.9.I

09.02 Examine the influence of personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly on the Engineering Design process. STL.9.J, LA.D.1.4, SC.H.1.4

09.03 Construct a prototype or a working model used to test a design concept by making actual observations and necessary adjustments. STL.9.K, MA.B.1.4, SC.H.1.4, SC.H.3.4

09.04 Evaluate factors taken into account in the process of engineering. STL.9.L

10.0 Demonstrate an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving. The student will be able to:

10.01 Employ research and development as a specific problem solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace. STL.10.I

10.02 Conduct research needed to solve technological problems. STL.10.J, LA.A.1.4, LA.A.2.4

10.03 Differentiate between technological and non-technological problems, and identify which problems can be solved using technology. STL.10.K, SC.H.1.4

10.04 Utilize a multidisciplinary approach to solving technological problems. STL.10.L, MA.A.1.4, MA.A.3.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.E.1.4, MA.E.3.4, SC.H.1.4, SC.H.3.4

11.0 Demonstrate the abilities to apply the design process. The student will be able to:

11.01 Interpret the design problem to solve and decide whether or not to address it. STL.11.M, SC.H.1.4

11.02 Evaluate criteria and constraints and determine how these will affect the design process. STL.11.N, MA.A.3.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.D.1.4, MA.D.2.4, MA.E.1.4, SC.H.1.4, SC.H.3.4

11.03 Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product. STL.11.0, SC.H.3.4

11.04 Evaluate the design solution using conceptual, physical, and mathematical models at various intervals of the design process in order to check for proper design and to note areas where improvements are needed. STL.11.P, MA.A.4.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, SC.H.1.4, SC.H.3.4

11.05 Produce a product or system using a design process. STL.11.Q

11.06 Evaluate final solutions and communicate observations, processes, and results of the entire design process, using verbal, graphic, quantitative, virtual, and written means, in addition to three-dimensional models. STL.11.R, LA.B.2.4, LA.C.3.4, MA.B.4.4, MA.D.2.4, MA.E.1.4, MA.E.2.4, MA.E.3.4, SC.H.1.4, SC.H.3.4

12.0 Demonstrate the abilities to use and maintain technological products and systems. The student will be able to:

12.01 Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques. STL.12.L, LA.B.2.4, LA.B.1.4, LA.C.3.4

12.02 Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it. STL.12.M

12.03 Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision. STL.12.N

12.04 Operate systems so that they function in the way they were designed. STL.12.O

12.05 Use computers and calculators to access, retrieve, organize, process, maintain, interpret, and evaluate data and information in order to communicate. STL.12.P, LA.A.2.4, MA.E.1.4

13.0 Demonstrate the abilities to assess the impact of products and systems. The student will be able to:

13.01 Collect information and evaluate its quality. STL.13.J, LA.A.2.4, SC.H.1.4
13.02 Synthesize data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and the environment. STL.13.K, LA.A.2.4, SC.G.1.4, SC.G.2.4, SC.H.1.4
13.03 Apply assessment techniques, such as trend analysis and experimentation to make decisions about the future development of technology. STL.13.L, LA.A.2.4, MA.E.1.4, MA.E.2.4, MA.E.3.4
13.04 Design forecasting techniques to evaluate the results of altering natural systems. STL.13.M, MA.E.3.4, SC.G.2.4

14.0 Demonstrate an understanding of and be able to select and use medical technologies. The student will be able to:
14.01 Classify medical technologies including prevention and rehabilitation, vaccines and pharmaceuticals, medical and surgical procedures, genetic engineering, and the systems within which health is protected and maintained. (STL 14.K)
14.02 Discuss telemedicine and its convergence of technological advances in a number of fields, including medicine, virtual presence, computer engineering, informatics, artificial intelligence, robotics, materials science, and perceptual psychology. (STL 14.L)
14.03 Explain how the sciences of biochemistry and molecular biology have made it possible to manipulate the genetic information found in living creatures. (STL 14.M)

15.0 Demonstrate an understanding of and be able to select and use agricultural and related biotechnologies. The student will be able to:
15.01 Discuss agriculture, including a combination of businesses that use a wide array of products and systems to produce, process, and distribute food, fiber, fuel, chemical, and other useful products. STL.15.K
15.02 Identify biotechnology applications in such areas as agriculture, pharmaceuticals, food and beverages, medicine, energy, the environment, and genetic engineering. STL.15.L
15.03 Define conservation as the process of controlling soil erosion, reducing sediment in waterways, and improving water quality. STL.15.M
15.04 Apply engineering design processes to management of agricultural systems requiring knowledge of artificial ecosystems and the effects of technological development on flora and fauna. STL.15.N

16.0 Demonstrate an understanding of and be able to select and use energy and power technologies. The student will be able to:
16.01 Discuss how energy cannot be created nor destroyed; however, it can be converted from one form to another. STL.16.J
16.02 Categorize types of energy into major forms: thermal, radiant, electrical, mechanical, chemical, nuclear, and others. STL.16.K
16.03 Explain impossibility of building an engine to perform work that does not exhaust thermal energy to the surroundings. STL.16.L
16.04 Classify energy resources as renewable or nonrenewable. STL.16.M
16.05 Construct a power system having a source of energy, a process, and loads. STL.16.N

17.0 Demonstrate an understanding of and be able to select and use information and communication technologies. The student will be able to:

17.01 Discuss information and communication technologies including the inputs, processes, and outputs associated with sending and receiving information. STL.17.L

17.02 Classify information and communication systems that allow information to be transferred as human to human, human to machine, machine to human, or machine to machine. STL.17.M

17.03 Use information and communication systems to inform, persuade, entertain, control, manage, and educate. STL.17.N

17.04 Identify components of a communications system, including source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination. STL.17.0

17.05 Identify many ways to communicate information, such as graphic and electronic means. STL.17.P

17.06 Communicate technological knowledge and processes using symbols, measurement, conventions, icons, graphic images, and languages that incorporate a variety of visual, auditory, and tactile stimuli. STL.17.Q

18.0 Demonstrate an understanding of and be able to select and use transportation technologies. The student will be able to:

18.01 Analyze the vital role played by transportation in the operation of other technologies, such as manufacturing, construction, communication, health and safety, and agriculture. STL.18.J

18.02 Define intermodalism as the use of different modes of transportation, such as highways, railways, and waterways as part of an interconnected system that can move people and goods easily from one mode to another. STL.18.K

18.03 Discuss how transportation services and methods have led to a population that is regularly on the move. STL.18.L

18.04 Identify processes and innovative techniques involved in the design of intelligent and nonintelligent transportation systems. STL.18.M

19.0 Demonstrate an understanding of and be able to select and use manufacturing technologies. The student will be able to:

19.01 Service products to keep them in good operating condition. STL.19.L

19.02 Classify materials based on their qualities as natural, synthetic, or mixed. STL.19.M

19.03 Classify goods as durable goods designed to operate for a long period of time, or non-durable goods designed to operate for a short period of time. STL.19.N

19.04 Identify and classify manufacturing systems into types, such as customized production, batch production, and continuous production. STL.19.0

19.05 Discuss the interchangeability of parts to increase the effectiveness of manufacturing processes. STL.19.P

19.06 Identify chemical technologies providing a means for humans to alter or modify materials and to produce chemical products. STL.19.Q

19.07 Employ marketing techniques involving establishing a product’s identity, conducting research on its potential, advertising it, distributing it, and selling it. STL.19.R

20.0 Demonstrate an understanding of and be able to select and use construction technologies. The student will be able to:

20.01 Define infrastructure as the underlying base or basic framework of a system. STL.20.J

20.02 Identify a variety of processes and procedures used in constructing structures. STL.20.K

20.03 Identify requirements involved in the design of structures. STL.20.L

20.04 Recommend maintenance, alterations, or renovations to improve a structure or alter its intended use. STL.20.M

20.05 Identify prefabricated materials used in some structures. STL.20.N

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8600150
Course Title: Technological Issues
Course Credit: 1

COURSE DESCRIPTION: In *Technological Issues,* students learn that technology allows us to extend our ability to modify or change the natural world to meet our wants and needs. However, the resulting changes can be complicated and unpredictable. Solutions to a particular problem may cause other types of problems. Each potential technological solution creates certain issues, such as benefits, costs, risks and limitations. Not all impacts of technology are predictable or show up right away. However, the key issues of a technology should be studied and debated prior to the technology being introduced or eliminated. Alternatives should be explored, scientific and mathematical dimensions should be integrated into the decision.

Technological issues are not solely technical in nature. Attitudes towards technology can be influenced by social, cultural, economical, political, and ecological concerns. The decision to introduce or eliminate a technology will affect different people, and vary depending on the timing. Issues can create some heated debates, which require that both sides of the debate to acquire detailed information and ask the right questions. Students learn that by studying technological issues, there may not be a solution that everyone agrees upon, nor everyone benefits or receives the cost in the same way. The study of technological issues will not give students the correct answers, but allows them to develop skills in asking critical questions, understanding alternative viewpoints and their origins, and give them the confidence to be involved in deciding which technologies to develop, which to use, and how to use them.

1.0 Demonstrate an understanding of the characteristics and scope of technology. The student will be able to:
- 01.01 Discuss the nature and development of technological knowledge and processes. STL.1.J, LA.B.2.4, LA.C.3.4, SC.H.3.4
- 01.02 Graph the rapid increase in the rate of technological development and diffusion. STL.1.K, LA.B.2.4, LA.D.2.4, MA.B.1.4
- 01.03 Conduct specific goal-directed research related to inventions and innovations. STL.1.L, LA.A.1.4, LA.A.2.4, LA.B.2.4
- 01.04 Evaluate current technological developments that are/were driven by profit motive and the market. STL.1.M, SS.D.1.4

3.0 Demonstrate an understanding of the relationships among technologies and the connection between technology and other fields of study. The student will be able to:
- 03.01 Report the process of patenting to protect a technological idea. STL.3.I
- 03.02 Investigate technological progresses that promote the advancement of science and mathematics. STL.3.J, LA.A.1.4, LA.B.1.4, SC.H.3.4

4.0 Demonstrate an understanding of the cultural, social, economic, and political effects of technology. The student will be able to:
- 04.01 Evaluate the use of technology involving weighing the trade-offs between the positive and the negative effects. STL.4.I, LA.B.2.4

04.02 Discuss ethical considerations important in the development, selection, and use of technologies. STL.4.J, SC.H.1.4, SS.C.2.4

04.03 Debate the cultural, social, economic, and political changes caused by the transfer of a technology from one society to another. STL.4.K, LA.B.2.4, LA.E.1.4, SC.H.3.4

5.0 Demonstrate an understanding of the effects of technology on the environment. The student will be able to:

05.01 Devise technologies to conserve water, soil, and energy through such techniques as reusing, reducing and recycling. STL.5.G, SC.G.1.4, SC.G.2.4, SS.B.2.4

05.02 Make decisions about the implementation of technologies involving the weighing of trade-offs between predicted positive and negative effects on the environment. STL.5.L, SC.G.2.4, SC.H.3.4

7.0 Demonstrate an understanding of the influence of technology on history. The student will be able to:

07.01 Assess how the evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools and materials. STL.7.H, LA.A.1.4, LA.A.2.4, LA.B.2.4, SC.H.3.4, SS.A.2.4

07.02 Research the history of technology as a powerful force in reshaping the social, cultural, political, and economic landscape. STL.7.I, LA.D.2.4, SS.A.2.4

07.03 Discuss the Information Age and its placement of emphasis on the processing and exchange of information. STL.7.O, SS.A.5.4

10.0 Demonstrate an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving. The student will be able to:

10.01 Conduct research needed to solve technological problems. STL.10.J, LA.A.1.4, LA.A.2.4

10.02 Differentiate between technological and non-technological problems, and identify which problems can be solved using technology. STL.10.K, SC.H.1.4

10.03 Utilize a multidisciplinary approach to solving technological problems. STL.10.L, MA.A.1.4, MA.A.3.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.E.1.4, MA.E.3.4, SC.H.1.4, SC.H.3.4

11.0 Demonstrate the abilities to apply the design process. The student will be able to:

11.01 Interpret the design problem to solve and decide whether or not to address it. STL.11.M, SC.H.1.4

13.0 Demonstrate the abilities to assess the impact of products and systems. The student will be able to:

13.01 Collect information and evaluate its quality. STL.13.J, LA.A.2.4, SC.H.1.4

13.02 Synthesize data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and the environment. STL.13.K, LA.A.2.4, SC.G.1.4, SC.G.2.4, SC.H.1.4

13.03 Apply assessment techniques, such as trend analysis and experimentation to make decisions about the future development of technology. STL.13.L, LA.A.2.4, MA.E.1.4, MA.E.2.4, MA.E.3.4

13.04 Design forecasting techniques to evaluate the results of altering natural systems. STL.13.M, MA.E.3.4, SC.G.2.4

14.0 Demonstrate an understanding of and be able to select and use medical technologies. The student will be able to:

14.01 Explain how the sciences of biochemistry and molecular biology have made it possible to manipulate the genetic information found in living creatures. (STL 14.M)

15.0 Demonstrate an understanding of and be able to select and use agricultural and related biotechnologies. The student will be able to:

15.01 Identify biotechnology applications in such areas as agriculture, pharmaceuticals, food and beverages, medicine, energy, the environment, and genetic engineering. STL.15.L

15.02 Define conservation as the process of controlling soil erosion, reducing sediment in waterways, and improving water quality. STL.15.M

16.0 Demonstrate an understanding of and be able to select and use energy and power technologies. The student will be able to:

16.01 Classify energy resources as renewable or nonrenewable. STL.16.M

17.0 Demonstrate an understanding of and be able to select and use information and communication technologies. The student will be able to:

17.01 Use information and communication systems to inform, persuade, entertain, control, manage, and educate. STL.17.N

17.02 Identify many ways to communicate information, such as graphic and electronic means. STL.17.P

19.0 Demonstrate an understanding of and be able to select and use manufacturing technologies. The student will be able to:

19.01 Employ marketing techniques involving establishing a product’s identity, conducting research on its potential, advertising it, distributing it, and selling it. STL.19.R

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8600160
Course Title: Engineering Design
Course Credit: 1

COURSE DESCRIPTION: *Engineering Design* contributes to the development of each high school student's capacity to make responsible judgments about technology's development, control, and use. Critiquing appropriate technology and sustainable development are important. The structure of the course brings discussions of technological values so that students can reflect and develop their own ethical standards. Students are actively involved in the organized and integrated application of technological resources, engineering concepts, and scientific procedures. Through high school technology education experiences, students address the complexities of technology and issues that stem from designing, developing, using, and assessing technological systems. In developing a functional understanding of technology, students comprehend how human conditions, current affairs, and personal preferences drive technological design and problem solving. Actively engaged in making and developing, using, and managing technological systems, students better understand the role of systems in meeting specific purposes. Students are able to analyze and understand the behavior and operation of basic technological systems in different contexts. Students are able to extend their knowledge of systems to new and emerging applications by the time they graduate from high school. As the capstone experience for the ***Engineering By Design Program***, Engineering Design provides students with the knowledge and skills to delve deeper into Engineering at the post-secondary level.

1.0 Demonstrate an understanding of the characteristics and scope of technology. The student will be able to:
- 01.01 Discuss the nature and development of technological knowledge and processes. STL.1.J, LA.B.2.4, LA.C.3.4, SC.H.3.4
- 01.02 Conduct specific goal-directed research related to inventions and innovations. STL.1.L, LA.A.1.4, LA.A.2.4, LA.B.2.4
- 01.03 Evaluate current technological developments that are/were driven by profit motive and the market. STL.1.M, SS.D.1.4

2.0 Demonstrate an understanding of the core concepts of technology. The student will be able to:
- 02.01 Apply systems thinking logic and creativity with appropriate compromises in complex real-life problems. STL.2.W
- 02.02 Assess the stability of a technological system and its influence by all of the components in the system, especially those in the feedback loop. STL.2.Y
- 02.03 Compare resources involving trade-offs between competing values, such as availability, cost, desirability, and waste. STL.2.Z, SS.D.1.4
- 02.04 Identify the criteria and constraints of a product or system and then determine how they affect the final design and development. STL.2.AA, MA.A.5.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.E.3.4, SC.H.1.4

02.05 Propose strategies for optimizing a technological process or methodology of designing or making a product, dependent on criteria and constraints. STL.2.BB
02.06 Discuss new technologies that create new processes. STL.2.CC
02.07 Recommend a quality control process to ensure that a product, service or system meets established criteria. STL.2.DD
02.08 Organize a management system as the process of planning, organizing, and controlling work. STL.2.EE
02.09 Outline complex systems that have many layers of controls and feedback loops to provide information. STL.2.FF

3.0 Demonstrate an understanding of the relationships among technologies and the connection between technology and other fields of study. The student will be able to:
03.01 Create technology transfer occurring when a new user applies an existing innovation developed for one purpose in a different function. STL.3.G, SC.H.3.4
03.02 Examine technological innovation resulting when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields. STL.3.H, SC.H.3.4
03.03 Report the process of patenting to protect a technological idea. STL.3.I

4.0 Demonstrate an understanding of the cultural, social, economic, and political effects of technology. The student will be able to:
04.01 Discuss ethical considerations important in the development, selection, and use of technologies. STL.4.J, SC.H.1.4, SS.C.2.4

5.0 Demonstrate an understanding of the effects of technology on the environment. The student will be able to:
05.01 Devise technologies to conserve water, soil, and energy through such techniques as reusing, reducing and recycling. STL.5.G, SC.G.1.4, SC.G.2.4, SS.B.2.4
05.02 Consider trade-offs of developing technologies to reduce the use of resources. STL.5.H, SC.G.2.4, SS.D.1.4
05.03 Assess technologies devised to reduce the negative consequences of other technologies. STL.5.K

6.0 Demonstrate an understanding of the role of society in the development and use of technology. The student will be able to:
06.01 Consider societal opinions and demands, as well as corporate cultures to use as a basis for deciding whether or not to develop a technology. STL.6.I

8.0 Demonstrate an understanding of the attributes of design. The student will be able to:
08.01 Implement the design process; including defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results. STL.8.H
08.02 Translate design problems that are seldom presented in a clearly defined form. STL.8.I, LA.D.1.4, LA.D.2.4

08.03 Evaluate a design continually, and improve and revise the idea of the design as needed. STL.8.J, SC.H.1.4
08.04 Analyze competing requirements of a design, such as criteria, constraints, and efficiency. STL.8.K, MA.A.3.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.D.1.4, MA.D.2.4, MA.E.1.4

9.0 Demonstrate an understanding of the engineering design. The student will be able to:
09.01 Select design principles used to evaluate existing designs, to collect data, and to guide the design process. STL.9.I
09.02 Examine the influence of personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly on the Engineering Design process. STL.9.J, LA.D.1.4, SC.H.1.4
09.03 Construct a prototype or a working model used to test a design concept by making actual observations and necessary adjustments. STL.9.K, MA.B.1.4, SC.H.1.4, SC.H.3.4
09.04 Evaluate factors taken into account in the process of engineering. STL.9.L

10.0 Demonstrate an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving. The student will be able to:
10.01 Employ research and development as a specific problem solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace. STL.10.I

11.0 Demonstrate the abilities to apply the design process. The student will be able to:
11.01 Evaluate criteria and constraints and determine how these will affect the design process. STL.11.N, MA.A.3.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.D.1.4, MA.D.2.4, MA.E.1.4, SC.H.1.4, SC.H.3.4
11.02 Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product. STL.11.0, SC.H.3.4
11.03 Evaluate the design solution using conceptual, physical, and mathematical models at various intervals of the design process in order to check for proper design and to note areas where improvements are needed. STL.11.P, MA.A.4.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, SC.H.1.4, SC.H.3.4
11.04 Produce a product or system using a design process. STL.11.Q
11.05 Evaluate final solutions and communicate observations, processes, and results of the entire design process, using verbal, graphic, quantitative, virtual, and written means, in addition to three-dimensional models. STL.11.R, LA.B.2.4, LA.C.3.4, MA.B.4.4, MA.D.2.4, MA.E.1.4, MA.E.2.4, MA.E.3.4, SC.H.1.4, SC.H.3.4

15.0 Demonstrate an understanding of and be able to select and use agricultural and related biotechnologies. The student will be able to:
15.01 Apply engineering design processes to management of agricultural systems requiring knowledge of artificial ecosystems and the effects of technological development on flora and fauna. STL.15.N

16.0 Demonstrate an understanding of and be able to select and use energy and power technologies. The student will be able to:

16.01 Discuss how energy cannot be created nor destroyed; however, it can be converted from one form to another. STL.16.J
16.02 Categorize types of energy into major forms: thermal, radiant, electrical, mechanical, chemical, nuclear, and others. STL.16.K
16.03 Explain impossibility of building an engine to perform work that does not exhaust thermal energy to the surroundings. STL.16.L
16.04 Classify energy resources as renewable or nonrenewable. STL.16.M
16.05 Construct a power system having a source of energy, a process, and loads. STL.16.N

17.0 Demonstrate an understanding of and be able to select and use information and communication technologies. The student will be able to:
17.01 Identify many ways to communicate information, such as graphic and electronic means. STL.17.P
17.02 Communicate technological knowledge and processes using symbols, measurement, conventions, icons, graphic images, and languages that incorporate a variety of visual, auditory, and tactile stimuli. STL.17.Q

18.0 Demonstrate an understanding of and be able to select and use transportation technologies. The student will be able to:
18.01 Identify processes and innovative techniques involved in the design of intelligent and nonintelligent transportation systems. STL.18.M

19.0 Demonstrate an understanding of and be able to select and use manufacturing technologies. The student will be able to:
19.01 Classify materials based on their qualities as natural, synthetic, or mixed. STL.19.M
19.02 Classify goods as durable goods designed to operate for a long period of time, or non-durable goods designed to operate for a short period of time. STL.19.N
19.03 Identify and classify manufacturing systems into types, such as customized production, batch production, and continuous production. STL.19.0
19.04 Discuss the interchangeability of parts to increase the effectiveness of manufacturing processes. STL.19.P

20.0 Demonstrate an understanding of and be able to select and use construction technologies. The student will be able to:
20.01 Identify requirements involved in the design of structures. STL.20.L
20.02 Recommend maintenance, alterations, or renovations to improve a structure or alter its intended use. STL.20.M
20.03 Identify prefabricated materials used in some structures. STL.20.N