Florida Department of Education
Curriculum Framework

Program Title: **Integrated Technology Studies**
Program Type: **Orientation/Exploratory**
Career Cluster: **Engineering & Technology Education**

Secondary – Middle School	
Program Number	8600000
CIP Number	08210122EX
Grade Level	6 – 8
Standard Length	Semester
Teacher Certification	Refer to the **Program Structure** section
CTSO	FL-TSA

Purpose

The purpose of this program is to provide students with a foundation of knowledge and technically oriented experiences in the study of the applications of technology and its effect upon our lives and the choosing of an occupation. The content and activities will also include the study of safety, and leadership skills. This program focuses on transferable skills and stresses understanding and demonstration of the technological tools, machines, instruments, materials, processes and systems in business and industry.

The emphasis of this program is on developing awareness of future needs, developing technological competence, confidence and awareness through interaction with technologies, developing awareness of other career programs, interacting with business, industry and community organizations, applying basic skills in learning activities, and developing self-awareness of individual abilities, needs and interests. The courses are intended to help students develop their problem-solving skills and creativity while learning about technology and careers in the Engineering & Technology Education career cluster. Students will learn to gather data through research and testing, as well as to document their results and processes.

The content includes introductory studies in areas of technology which introduce students to the development of abilities to calculate, make important observation's, analyze and solve problems using manipulative skills while working cooperatively with others in team activities.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program contains a series of instructional courses listed below.

The lengths of these courses are one semester. They may be offered for two semesters when appropriate. When offered for one semester, it is recommended that the course be at the exploratory level and more in-depth when offered for two semesters.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the course structure:

Course Number	Course Title	Teacher Certification	Length
8600010	Introduction to Technology	ENG 7G ENG TEC 7G PLTW PTE 7G TEC ED 1 @2 ENG&TEC ED1@2 TRANSPORT 7G	Semester
8600020	Exploring Technology		Semester
8600030	Exploration of Communications Technology	COMM ART @7 7G ENG 7G GRAPH ARTS @4 PRINTING @7 7G TEC ED 1 @2 ENG&TEC ED1@2	Semester
8600040	Exploration of Production Technology	AUTO PROD 7G BLDG CONST @7 7G BLDG MAINT @7 7G CARPENTRY @7 7G ENG 7G ENG TEC 7G METALWORK 7G PLTW PTE 7G TEC CONSTR @7 7G TEC ED 1 @2 ENG&TEC ED1@2	Semester
8600050	Exploration of Aerospace Technology	AEROSPACE 7G ENG 7G ENG TEC 7G PLTW PTE 7G TEC ED 1 @2 ENG&TEC ED1@2 TRANSPORT 7G	Semester
8600240	Exploration of Transportation Technology	AIR MECH @7 7G AUTO IND @7 %7 %G AUTO MECH @7 7G DIESEL MECH @7 7G	Semester

Course Number	Course Title	Teacher Certification	Length
		ENG 7G GASENG RPR @7 7G TEC ED 1 @2 ENG&TEC ED1@2 TEC MECH 7G TRANSPORT 7G	
8600250	Exploration of Power and Energy Technology	AUTO IND @7 %7 %G AUTO MECH @7 7G DIESEL MECH @7 7G ENG 7G GASENG RPR @7 7G TEC ED 1 @2 ENG&TEC ED1@2 TEC MECH 7G TRANSPORT 7G	Semester
8600060	Exploration of Engineering Technology	ENG 7G ENG TEC 7G PLTW PTE 7G TEC ED 1 @2 ENG&TEC ED1@2	Semester
8600070	Exploration of Robotics Technology	ENG 7G ENG TEC 7G ROBOTICS 7G TEC ED 1 @2 ENG&TEC ED1@2	Semester
8600090	Exploration of Technical Design Technology	DRAFTING @7 7G ENG 7G ENG TEC 7G GRAPH ARTS @4 PLTW PTE 7G TEC ED 1 @2 ENG&TEC ED1@2	Semester
8600091	Exploration of Electronics Technology	ELECTRICAL @7 7G ELECTRONIC @7 7G ENG 7G ENG TEC 7G PLTW PTE 7G TEC ED 1 @2 ENG&TEC ED1@2 TEC ELEC @7 7G	Semester

Course Number	Course Title	Teacher Certification	Length
8600092	Exploration of Maritime Technology	ENG 7G ENG TEC 7G SEAMANSHIP 7G TEC ED 1 @2 ENG&TEC ED1@2	Semester
8600093	Exploration of Logistics and Supply Chain Technology	BUS ED 1 ENG 7G ENG TEC 7G LOG TECH 7G TEC ED 1 @2 ENG&TEC ED1@2	Semester
8600094	Exploration of Green Construction and Architecture Technology	BLDG CONST @7 7G BLDG MAINT @7 7G CARPTENTRY @7 7G DRAFTING @7 7G ENG 7G ENG TEC 7G PLTW PTE 7G TEC CONSTR @7 7G TEC DRAFT 7G TEC ED 1 @2 ENG&TEC ED1@2	Semester

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate an understanding of the characteristics and scope of technology.
02.0 Demonstrate an understanding of the core concepts of technology.
03.0 Demonstrate an understanding of the relationships among technologies and the connection between technology and other fields of study.
04.0 Demonstrate an understanding of the cultural, social, economic, and political effects of technology.
05.0 Demonstrate an understanding of the effects of technology on the environment.
06.0 Demonstrate an understanding of the role of society in the development and use of technology.
07.0 Demonstrate an understanding of the influence of technology on history.
08.0 Demonstrate an understanding of the attributes of design.
09.0 Demonstrate an understanding of 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 communications 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.
21.0 Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials.
22.0 Exhibit positive human relations and leadership skills.
23.0 Discuss individual interests, aptitudes, and opportunities as they relate to a career.

Exploration of Communications Technology

24.0 Demonstrate an application of basic digital publishing techniques.
25.0 Identify and describe the major types of printing techniques used in print production.
26.0 Identify and demonstrate the role of electronic communication.
27.0 Identify and demonstrate the role of optical technology.

Exploration of Production Technology

28.0 Identify evolving technologies of Production Systems.
29.0 Perform special skills unique to Manufacturing Technology.
30.0 Express knowledge of factors that impact Manufacturing Technologies and practices.

Exploration of Aerospace Technology

31.0 Discuss educational and training requirements as they relate to various aerospace careers.

32.0 Demonstrate an understanding of and be able to select and use aerospace technologies.
33.0 Demonstrate knowledge of the basic principles of aerostatics and aerodynamics.
34.0 Identify and demonstrate knowledge of both liquid and solid propellant rocket propulsion systems.
35.0 Define and describe the stages and forms of interference in basic satellite communication systems.
36.0 Become familiar with the basic information provided by a sectional chart.
37.0 Describe and define different categories of aviation.

Exploration of Transportation Technology
38.0 Perform special skills unique to transportation technologies.
39.0 Express knowledge of the industries that deal with transportation technology.

Exploration of Power and Energy Technology
40.0 Perform special skills unique to power and energy technologies.
41.0 Express knowledge of the industries that deal with power and energy technology.

Exploration of Engineering Technology
42.0 Demonstrate skill in technical sketching and drawing as it relates to engineering design.
43.0 Demonstrate foundational knowledge and skills associated with the design of engineering systems (e.g. mechanical, fluid, electrical systems).
44.0 Demonstrate understanding and use of measurement tools and systems.
45.0 Demonstrate an understanding of the engineering process.
46.0 Demonstrate foundational knowledge and skills associated with common computer peripherals and computer functions.
47.0 Demonstrate an understanding of Internet safety and ethics.
48.0 Develop fundamental business productivity software skills.
49.0 Successfully work as a member of a team.

Exploration of Robotics Technology
50.0 Demonstrate an understanding of robotics, its history, applications, and evolution.
51.0 Demonstrate an understanding of basic programming concepts.
52.0 Identify the basic subsystems on a robotic system.
53.0 Describe the role of sensors in the field of robotics.
54.0 Build, program, and configure a robot to perform predefined tasks.
55.0 Solve problems using critical thinking skills, creativity and innovation.

Exploration of Technical Design Technology
56.0 Demonstrate technical skills and applications common to all types of drafting.
57.0 Demonstrate technical knowledge and skills for making basic orthographic drawings.
58.0 Demonstrate technical knowledge and skills for making pictorial drawings.
59.0 Demonstrate technical knowledge and skills for making a three-dimensional study model.

Exploration of Electronics Technology
60.0 Demonstrate an understanding of the nature of electricity.

61.0 Explore the basics of electric circuits.
62.0 Investigate digital signals and basic digital components.
63.0 Demonstrate and apply proper use of electronic equipment.
64.0 Demonstrate proper electronic assembly methods.

Exploration of Maritime Technology

65.0 Demonstrate knowledge relating to the historical origins of the maritime industry from vessel development, cultural, and trade perspectives.
66.0 Demonstrate proficiency in understanding the various career paths in the maritime industry.
67.0 Demonstrate an understanding of required skills sets by mariners including, safety training, regulations, and leadership.
68.0 Demonstrate proficiency in using engineering methods for ship construction and design.
69.0 Identify and explain various vessels and their and their use.
70.0 Evaluate the environmental impact of the maritime industry.
71.0 Examine the potential and use of marine resources.
72.0 Demonstrate an understanding of oceanography concepts.
73.0 Demonstrate an understanding of the fundamentals of marine biology.

Exploration of Logistics and Supply Chain Technology

74.0 Demonstrate an understanding of global logistics and supply chain.
75.0 Demonstrate an understanding of transportation systems.
76.0 Demonstrate professional communication skills.
77.0 Demonstrate customer service skills.
78.0 Demonstrate an understanding of warehouse operations.
79.0 Demonstrate an understanding of storage and control operations.

Exploration of Green Construction and Architecture Technology

80.0 Demonstrate an understanding of the built environment.
81.0 Demonstrate an understanding of the green environment.
82.0 Use building laws and codes, style, convenience, cost, climate, and function to select building designs.
83.0 Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
84.0 Describe the human impact on the environment and identify ways to minimize environmental impacts.
85.0 Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions and accurately measure drawing dimensions.

Florida Department of Education
Student Performance Standards

Course Title: **Introduction to Technology**
Course Number: **8600010**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:
The purpose of this course is to give students an introduction to the areas of technology and to introduce students to the design and problem solving processes using manipulative skills while working cooperatively with others in team activities.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Identify technological systems including input, processes, output, and, at times, feedback.
02.02	Define systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control system using feedback.
02.04	Identify how technological systems can be connected to one another.
02.05	Diagnose malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Identify requirements or parameters placed on the development of a product or system.
02.07	Identify trade-offs as a decision process recognizing the need for careful compromises among competing factors.
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	Explain how technological systems interact with one another.
03.02	Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
04.01	Describe ethical issues associated with the development and use of technology.

CTE Standards and Benchmarks	
	04.02 Describe the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
	05.01 Describe the management of waste produced by technological systems as an important societal issue.
	05.02 Identify how technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
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 Identify changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
	06.02 Understand how social and cultural priorities and values are reflected in technological devices.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
	07.01 Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
	07.02 Explain how the specialization of function has been at the heart of many technological improvements.
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:
	08.01 Use design as a creative planning process that leads to useful products and systems.
	08.02 Explain why there is no perfect design.
	08.03 Identify criteria and constraints that are requirements for a design.
	08.04 Demonstrate the ability to properly identify different resources used in projects.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
	09.01 Identify the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
	09.02 Define brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
	09.03 Model, test, evaluate and modify designs to transform ideas into practical solutions.
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 Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
	10.02 Define invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
	10.03 Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
	11.01 Apply a design process to solve problems in and beyond the laboratory-classroom.
	11.02 Specify criteria and constraints for the design.

CTE Standards and Benchmarks	
	11.03 Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
	11.04 Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
	12.01 Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
	12.02 Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
	12.03 Use computers and calculators in various applications.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
	13.01 Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.
	13.02 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
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 advances and innovations in medical technologies are used to improve healthcare.
	14.02 Explain how the vaccines developed for use in immunization require specialized technologies to support environments in which a sufficient amount of vaccines are produced.
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 technological advances in agriculture directly affecting the time and number of people required to produce food for a large population.
	15.02 Explain how biotechnology applies the principles of biology to create commercial products or processes.
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 Define energy as the capacity to do work.
	16.02 Explain how energy can be used to do work, using many processes.
	16.03 Define power systems used to drive and provide propulsion to other technological products and systems.
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 information and communication systems that allow information to be transferred from human to human, human to machine, machine to machine, and machine to human.
	17.02 Define communication systems made up of a source, encoder, transmitter, receiver, decoder, and destination.
18.0	Demonstrate an understanding of and be able to select and use transportation technologies. – The student will be able to:
	18.01 Describe how transporting people and goods involve a combination of individuals and vehicles.
	18.02 Identify subsystems of transportation vehicles, such as structural, propulsion, suspension, guidance, control, and support that must function together for a system to work effectively.

CTE Standards and Benchmarks	
19.0	Demonstrate an understanding of and be able to select and use manufacturing technologies. – The student will be able to:
19.01	Define manufacturing systems using mechanical processes that change the form of materials through processes of separating, forming, combining, and conditioning them.
19.02	Classify manufactured goods as durable and non-durable.
19.03	Define manufacturing technologies that are used to modify or alter manufactured products.
19.04	Explain that materials must first be located before they can be extracted from the earth through processes such as harvesting, drilling, and mining.
20.0	Demonstrate an understanding of and be able to select and use construction technologies. – The student will be able to:
20.01	Identify factors such as style, convenience, cost, climate, and function in the selection of designs for structures.
20.02	Explain that structures rest on a foundation.
20.03	Classify structures as temporary or permanent.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
21.01	Follow classroom/laboratory safety rules and procedures.
21.02	Demonstrate good housekeeping at workstations within a classroom/laboratory.
21.03	Conduct classroom/laboratory activities and equipment operations in a safe manner.
21.04	Exercise care and respect for all tools, equipment, and materials.
21.05	Identify color-coding safety standards.
21.06	Safely use hand tools and power equipment.
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	Exhibit positive human relations and leadership skills. – The student will be able to:
22.01	Perform roles in a student personnel system or in a career and technical student organization (CTSO).
22.02	Work cooperatively with others.
23.0	Discuss individual interests, aptitudes, and opportunities as they relate to a career. – The student will be able to:
23.01	Describe individual strengths and weaknesses.
23.02	Discuss individual interests related to a career.
23.03	Identify careers within specific areas of technology.
23.04	Explore careers within specific areas of interest.

Florida Department of Education
Student Performance Standards

Course Title: **Exploring Technology**
Course Number: **8600020**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:
The purpose of this course is to give students an opportunity to explore the areas of technology and associated careers available in technical fields. Students will be given the opportunity to solve technological problems while gaining an understanding of the effects of technology on our everyday lives.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.04	Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Describe technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control systems using feedback.
02.04	Explain how technological systems can be connected to one another.
02.05	Repair malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Compare and contrast requirements or parameters placed on the development of a product or system.
02.07	Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors.
02.08	Describe different technologies that involve different sets of processes.
02.09	Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.
02.10	Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change.

CTE Standards and Benchmarks	
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	Modify the way technological systems interact with one another.
03.02	Apply a product, system, or environment developed for one setting in another setting.
03.03	Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
04.01	Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use.
04.02	Explain that technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.
04.03	Identify ethical issues associated with the development and use of technology.
04.04	Identify the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
05.01	Describe the management of waste produced by technological systems as an important societal issue.
05.02	Describe how technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
05.03	Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another.
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	Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
06.02	Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
06.03	Understand social and cultural priorities and values that are reflected in technological devices.
06.04	Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
07.01	Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
07.02	Explain how the specialization of function has been at the heart of many technological improvements.
07.03	Identify how the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
07.04	Investigate how, that in the past, an invention or innovation was not usually developed with the knowledge of science.
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:

CTE Standards and Benchmarks	
	08.01 Use design as a creative planning process that leads to useful products and systems.
	08.02 Explain why there is no perfect design.
	08.03 Evaluate criteria and constraints that are requirements for a design.
	08.04 Demonstrate the ability to properly identify different resources used in projects.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
	09.01 Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
	09.02 Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
	09.03 Model, test, evaluate and modify designs to transform ideas into practical solutions.
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 Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
	10.02 Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
	10.03 Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
	11.01 Apply a design process to solve problems in and beyond the laboratory-classroom.
	11.02 Specify criteria and constraints for the design.
	11.03 Make two-dimensional and three-dimensional representations of the designed solution.
	11.04 Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
	11.05 Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
	12.01 Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
	12.02 Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
	12.03 Use computers and calculators in various applications.
	12.04 Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
	13.01 Design and use instruments to gather data.
	13.02 Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.

CTE Standards and Benchmarks	
	13.03 Identify trends and monitor potential consequences of technological development.
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
14.0	Demonstrate an understanding of and be able to select and use medical technologies. – The student will be able to:
	14.01 Describe how advances and innovations in medical technologies are used to improve healthcare.
	14.02 Describe how sanitation processes used in the disposal of medical products help to protect people from harmful organisms and disease, and shape the ethics of medical safety.
	14.03 Explain how the vaccines developed for use in immunization require specialized technologies to support environments in which a sufficient amount of vaccines are produced.
	14.04 Describe genetic engineering involving modifying the structure of DNA to produce novel genetic make-ups.
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 Describe technological advances in agriculture directly affecting the time and number of people required to produce food for a large population.
	15.02 Describe how a wide range of specialized equipment and practices is used to improve the production of food, fiber, fuel, and other useful products and in the care of animals.
	15.03 Explain how biotechnology applies the principles of biology to create commercial products or processes.
	15.04 Create artificial ecosystems that are human-made complexes that replicate some aspects of natural environments.
	15.05 Explain how the development of refrigeration, freezing, dehydration, preservation, and irradiation provide long-term storage of food and reduce the health risks caused by tainted food.
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 Define energy as the capacity to do work.
	16.02 Explain how energy can be used to do work, using many processes.
	16.03 Define power as the rate at which energy is converted from one form to another or transferred from one place to another, or the rate at which work is done.
	16.04 Describe power systems used to drive and provide propulsion to other technological products and systems.
	16.05 Explain how much of the energy used in our environment is not used efficiently.
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 Create information and communication systems that allow information to be transferred from human to human, human to machine, machine to machine, and machine to human.
	17.02 Describe communication systems made up of a source, encoder, transmitter, receiver, decoder, and destination.
	17.03 Consider factors that influence the design of a message, such as the intended audience, medium, purpose, and nature of the message.
	17.04 Use symbols, measurements, and drawings to promote clear communication by providing a common language to express ideas.

CTE Standards and Benchmarks	
18.0	Demonstrate an understanding of and be able to select and use transportation technologies. – The student will be able to:
18.01	Describe how transporting people and goods involve a combination of individuals and vehicles.
18.02	Describe subsystems of transportation vehicles, such as structural, propulsion, suspension, guidance, control, and support that must function together for a system to work effectively.
18.03	Summarize processes, such as receiving, holding, storing, loading, moving, unloading, delivering, evaluating, marketing, managing, communicating, and using conventions are necessary for the entire transportation system to operate efficiently.
18.04	Describe how governmental regulations often influence the design and operation of transportation systems.
19.0	Demonstrate an understanding of and be able to select and use manufacturing technologies. – The student will be able to:
19.01	Describe manufacturing systems using mechanical processes that change the form of materials through processes of separating, forming, combining, and conditioning them.
19.02	Classify manufactured goods as durable and non-durable.
19.03	Employ the manufacturing process including the designing, development, making, and servicing of products and systems.
19.04	Describe manufacturing technologies that are used to modify or alter manufactured products.
19.05	Explain that materials must first be located before they can be extracted from the earth through processes such as harvesting, drilling, and mining.
20.0	Demonstrate an understanding of and be able to select and use construction technologies. – The student will be able to:
20.01	Research building laws and codes.
20.02	Identify factors such as style, convenience, cost, climate, and function in the selection of designs for structures.
20.03	Explain that structures rest on a foundation.
20.04	Classify structures as temporary or permanent.
20.05	Describe subsystems of a building.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
21.01	Follow classroom/laboratory safety rules and procedures.
21.02	Demonstrate good housekeeping at workstations within a classroom/laboratory.
21.03	Conduct classroom/laboratory activities and equipment operations in a safe manner.
21.04	Exercise care and respect for all tools, equipment, and materials.
21.05	Select appropriate tools, machines, and equipment to accomplish a given task.
21.06	Identify color-coding safety standards.
21.07	Safely use hand tools and power equipment.

CTE Standards and Benchmarks	
	21.08 Explain fire prevention and safety precautions and practices for extinguishing fires.
	21.09 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
22.0	Exhibit positive human relations and leadership skills. – The student will be able to:
	22.01 Perform roles in a student personnel system or in a career and technical student organization (CTSO).
	22.02 Work cooperatively with others.
23.0	Discuss individual interests, aptitudes, and opportunities as they relate to a career. – The student will be able to:
	23.01 Identify individual strengths and weaknesses.
	23.02 Discuss individual interests related to a career.
	23.03 Identify careers within specific areas of technology.
	23.04 Explore careers within specific areas of interest.
	23.05 Form an understanding and appreciation for work after listening to or observing technology workers.
	23.06 Form an understanding and appreciation for work after participating in a simulated technology group project in the laboratory.
	23.07 Form an understanding and appreciation for the roles and work of technology workers.

Florida Department of Education
Student Performance Standards

Course Title: **Exploration of Communications Technology**
Course Number: **8600030**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:
The purpose of this course is to give students an opportunity to explore the area of communications technology and its associated careers. Students will be given the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of communications technology on our everyday lives. A list of minimum tools and equipment to implement this course is located at the end of this framework.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.04	(Explain, Demonstrate) how corporations can often create demand for a product by bringing it onto the market and advertising it.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Identify technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
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	Apply a product, system, or environment developed for one setting in another setting.
03.02	Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
04.01	Describe the ways that the use of communication technologies affects humans, including their safety, comfort, choices, and attitudes.
04.02	Explain that communication technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.
04.03	Describe ethical issues associated with the development and use of communication technology.

CTE Standards and Benchmarks	
	04.04 Describe the economic, political, and cultural issues that are influenced by the development and use of communication technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
	05.01 Describe the management of waste produced by communication technological systems as an important societal issue.
	05.02 Identify how communication technologies can be affected by natural disaster.
	05.03 Make decisions about the development and use of communication technologies that put environmental and economic concerns in direct competition with one another.
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 Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
	06.02 Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
	06.03 Describe social and cultural priorities and values that are reflected in technological devices.
	06.04 Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
	07.01 Describe inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
	07.02 Explain how the specialization of function has been at the heart of many technological improvements.
	07.03 Explain that in the past, an invention or innovation was not usually developed with the knowledge of science.
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:
	08.01 Use design as a creative planning process that leads to useful products and systems.
	08.02 Explain why there is no perfect design.
	08.03 Evaluate criteria and constraints that are requirements for a design.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
	09.01 Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
	09.02 Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
	09.03 Model, test, evaluate and modify designs to transform ideas into practical solutions.
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 Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
	10.02 Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.

CTE Standards and Benchmarks	
	10.03 Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
	11.01 Apply a design process to solve problems in and beyond the laboratory-classroom.
	11.02 Specify criteria and constraints for the design.
	11.03 Make two-dimensional and three-dimensional representations of the designed solution.
	11.04 Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
	11.05 Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
	12.01 Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
	12.02 Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
	12.03 Use computers and calculators in various applications.
	12.04 Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
	13.01 Design and use instruments to gather data.
	13.02 Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.
	13.03 Identify trends and monitor potential consequences of technological development.
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
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 Create information and communication that allow information to be transferred from human to human, human to machine, machine to machine, and machine to human.
	17.02 Consider factors that influence the design of a message, such as the intended audience, medium, purpose, and nature of the message.
	17.03 Use symbols, measurements, and drawings to promote clear communication by providing a common language to express ideas.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
	21.01 Follow classroom/laboratory safety rules and procedures.
	21.02 Demonstrate good housekeeping at workstations within a classroom/laboratory.
	21.03 Conduct classroom/laboratory activities and equipment operations in a safe manner.
	21.04 Exercise care and respect for all tools, equipment, and materials.

CTE Standards and Benchmarks	
	21.05 Select appropriate tools, machines, and equipment to accomplish a given task.
	21.06 Identify color-coding safety standards.
	21.07 Safely use hand tools and power equipment.
	21.08 Explain fire prevention and safety precautions and practices for extinguishing fires.
	21.09 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
22.0	Exhibit positive human relations and leadership skills. – The student will be able to:
	22.01 Perform roles in a student personnel system or in a career and technical student organization (CTSO).
	22.02 Work cooperatively with others.
23.0	Discuss individual interests and aptitudes as they relate to a career. – The student will be able to:
	23.01 Identify individual strengths and weaknesses.
	23.02 Discuss individual interests related to a career.
	23.03 List occupations, job requirements, and job opportunities in communication technology.
	23.04 List academic and career programs at the secondary levels in communication technology.
24.0	Demonstrate an application of basic digital publishing techniques. – The student will be able to:
	24.01 Utilize digital publishing to combine input, editing, and output into a finished product.
	24.02 Utilize the components of layouts including type, typography and illustration to digitally manipulate the elements of a published product.
	24.03 Develop a web page using appropriate digital software.
	24.04 Create a document on a digital publishing system by inputting existing digitized graphics or by digitizing original art or photographs on a digitizing scanner.
25.0	Identify and describe the major types of printing techniques used in print production. – The student will be able to:
	25.01 Identify and explain standard printing processes including but not limited to: relief, gravure, screen process, and lithographic printing.
	25.02 Utilize common design principles to create camera ready art.
	25.03 Produce a printed product using a current printing method.
	25.04 Utilize appropriate finishing techniques on a printed project.
26.0	Identify and demonstrate the role of electronic communication. – The student will be able to:
	26.01 Explain how to create code, transmit, and receive messages using electronic devices.
	26.02 List and explain the common communication categories.

CTE Standards and Benchmarks	
	26.03 Define and explain the use of telecommunications in everyday life.
	26.04 Utilize a telecommunications device to transmit and receive an electronic message.
	26.05 Produce an audio and/or visual product using electronic communication technology.
27.0	Identify and demonstrate the role of optical technology. – The student will be able to:
	27.01 Identify the purposes and property of light as used in communication technology.
	27.02 Explain how light signals are transmitted and received via different optical devices to include but not limited to: fiber optics, satellite communication, bandwidth, laser, and photography.
	27.03 Generate a product using optical technology.

***** Minimum Equipment and Tool needs for an Exploration of Communications Technology Course *****

1. No more than a 2 students/computer ratio complete with built in DVD drive; appropriate furniture; lockdowns, and chairs
2. Class set plus 5 of textbooks
3. Software (all to include site licenses): publishing; design; word processing; office management; Photoshop or equal; illustrator or equal; 3D animation
4. One working color inkjet/laser printer
5. Internet access to the entire lab
6. One teacher computer station with an ergonomic chair (height adjustable, cushioned, on wheels)
7. One scanner
8. Three digital cameras

Florida Department of Education
Student Performance Standards

Course Title: **Exploration of Production Technology**
Course Number: **8600040**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:
The purpose of this course is to give students an opportunity to explore the area of production technology and its associated careers. Students will be given the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of production technology on our everyday lives.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.04	Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Describe technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control system using feedback.
02.04	Explain how technological systems can be connected to one another.
02.05	Repair malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Compare and contrast requirements or parameters placed on the development of a product or system.
02.07	Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors.
02.08	Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.
02.09	Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change.
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:

CTE Standards and Benchmarks	
03.01	Modify the way technological systems interact with one another.
03.02	Apply a product, system, or environment developed for one setting in another setting.
03.03	Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
04.01	Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use.
04.02	Explain that technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.
04.03	Identify ethical issues associated with the development and use of technology.
04.04	Identify the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
05.01	Describe the management of waste produced by technological systems as an important societal issue.
05.02	Describe how technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
05.03	Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another.
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	Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
06.02	Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
06.03	Understand social and cultural priorities and values that are reflected in technological devices.
06.04	Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
07.01	Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
07.02	Explain how the specialization of function has been at the heart of many technological improvements.
07.03	Identify the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
07.04	Explain that in the past, an invention or innovation was not usually developed with the knowledge of science.
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:
08.01	Use design as a creative planning process that leads to useful products and systems.
08.02	Explain why there is no perfect design.

CTE Standards and Benchmarks	
	08.03 Evaluate criteria and constraints that are requirements for a design.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
	09.01 Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
	09.02 Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
	09.03 Model, test, evaluate and modify designs to transform ideas into practical solutions.
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 Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
	10.02 Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
	10.03 Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
	11.01 Apply a design process to solve problems in and beyond the laboratory-classroom.
	11.02 Specify criteria and constraints for the design.
	11.03 Make two-dimensional and three-dimensional representations of the designed solution.
	11.04 Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
	11.05 Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
	12.01 Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
	12.02 Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
	12.03 Use computers and calculators in various applications.
	12.04 Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
	13.01 Design and use instruments to gather data.
	13.02 Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.
	13.03 Identify trends and monitor potential consequences of technological development.
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
19.0	Demonstrate an understanding of and be able to select and use manufacturing technologies. – The student will be able to:

CTE Standards and Benchmarks	
	19.01 Describe manufacturing systems using mechanical processes that change the form of materials through processes of separating, forming, combining, and conditioning them.
	19.02 Classify manufactured goods as durable and non-durable.
	19.03 Employ the manufacturing process including the designing, development, making, and servicing of products and systems.
	19.04 Describe manufacturing technologies that are used to modify or alter manufactured products.
	19.05 Explain that materials must first be located before they can be extracted from the earth through processes such as harvesting, drilling, and mining.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
	21.01 Follow classroom/laboratory safety rules and procedures.
	21.02 Demonstrate good housekeeping at workstations within a classroom/laboratory.
	21.03 Conduct classroom/laboratory activities and equipment operations in a safe manner.
	21.04 Exercise care and respect for all tools, equipment, and materials.
	21.05 Select appropriate tools, machines, and equipment to accomplish a given task.
	21.06 Identify color-coding safety standards.
	21.07 Safely use hand tools and power equipment.
	21.08 Explain fire prevention and safety precautions and practices for extinguishing fires.
	21.09 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
22.0	Exhibit positive human relations and leadership skills. – The student will be able to:
	22.01 Perform roles in a student personnel system or in a career and technical student organization (CTSO).
	22.02 Work cooperatively with others.
23.0	Discuss individual interests, aptitudes, and opportunities as they relate to a career. – The student will be able to:
	23.01 Identify individual strengths and weaknesses.
	23.02 Discuss individual interests related to a career.
	23.03 List occupations, job requirements, and job opportunities in production technology.
	23.04 List occupational training programs and academic programs at the secondary/postsecondary levels in production technology.
28.0	Identify evolving technologies of production systems. – The student will be able to:
	28.01 List evolving technologies of manufacturing and construction industries.
	28.02 Discuss the evolution of technologies related to manufacturing systems and construction processes.

CTE Standards and Benchmarks	
	28.03 Brainstorm futuristic production systems.
29.0	Perform special skills unique to manufacturing technology. – The student will be able to:
	29.01 Design a product for custom or mass production manufacturing.
	29.02 Plan a mass production system for manufacturing a product.
	29.03 Perform materials forming practices such as casting or molding, and compressing or stretching.
	29.04 Perform materials separating practices such as shearing, chip removing, and other separating processes.
	29.05 Perform materials conditioning practices such as heat treating, physical conditioning, or through chemical reactions.
	29.06 Combine components through mixing, coating, bonding, and mechanical fastening.
	29.07 Assemble a product or a subassembly of a product.
30.0	Express knowledge of factors that impact manufacturing technology and practices. – The student will be able to:
	30.01 Explain economic factors that impact on manufacturing technology.
	30.02 Research and identify consumer demands for a manufactured product.
	30.03 Identify sources of raw materials and/or standard stock materials needed for a manufactured product.
	30.04 Interview, hire, train, or promote an applicant or employee for a simulated mass production manufacturing activity.
	30.05 Define the terms "organized labor" and "collective bargaining."
	30.06 Prepare a plan for marketing and distributing a manufactured product.

Florida Department of Education
Student Performance Standards

Course Title: **Exploration of Aerospace Technology**
Course Number: **8600050**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:
The purpose of this course is to give students an opportunity to explore the area of aerospace technology and its associated careers. Students will be given the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of aerospace technology on our everyday lives.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.02	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.03	Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
01.04	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Describe technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control systems using feedback.
02.04	Explain how technological systems can be connected to one another.
02.05	Repair malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Compare and contrast requirements or parameters placed on the development of a product or system.
02.07	Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors.
02.08	Describe different technologies that involve different sets of processes.
02.09	Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.
02.10	Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change.

CTE Standards and Benchmarks	
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	Modify the way technological systems interact with one another.
03.02	Apply a product, system, or environment developed for one setting in another setting.
03.03	Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
04.01	Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use.
04.02	Explain that technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.
04.03	Identify ethical issues associated with the development and use of technology.
04.04	Identify the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
05.01	Describe the management of waste produced by technological systems as an important societal issue.
05.02	Describe how technologies can be used to repair damage and to break down waste from the use of various products and systems.
05.03	Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another.
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	Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
06.02	Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
06.03	Understand social and cultural priorities and values that are reflected in technological devices.
06.04	Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
07.01	Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
07.02	Explain how the specialization of function has been at the heart of many technological improvements.
07.03	Identify the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
07.04	Investigate how, that in the past, an invention or innovation was not usually developed with the knowledge of science.
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:
08.01	Use design as a creative planning process that leads to useful products and systems.

CTE Standards and Benchmarks	
	08.02 Explain why there is no perfect design.
	08.03 Evaluate criteria and constraints that are requirements for a design.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
	09.01 Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
	09.02 Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
	09.03 Model, test, evaluate and modify designs to transform ideas into practical solutions.
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 Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
	10.02 Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
	10.03 Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
	11.01 Apply a design process to solve problems in and beyond the laboratory-classroom.
	11.02 Specify criteria and constraints for the design.
	11.03 Make two-dimensional and three-dimensional representations of the designed solution.
	11.04 Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
	11.05 Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
	12.01 Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
	12.02 Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
	12.03 Use computers and calculators in various applications.
	12.04 Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
	13.01 Design and use instruments to gather data.
	13.02 Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.
	13.03 Identify trends and monitor potential consequences of technological development.
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.

CTE Standards and Benchmarks	
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	Describe communication systems made up of a source, encoder, transmitter, receiver, decoder, and destination (e.g. phonetic alphabet).
17.02	Use symbols, measurements, and drawings to promote clear communication by providing a common language to express ideas (e.g. airport symbols and signs).
32.0	Demonstrate an understanding of and be able to select and use aerospace technologies. – The student will be able to:
32.01	Describe subsystems of aerospace vehicles, such as structural, propulsion, suspension, guidance, control, and support that must function together for a system to work effectively.
32.02	Employ processes, such as receiving, holding, storing, loading, moving, unloading, delivering, evaluating, marketing, managing, communicating, and using conventions that are necessary for the entire transportation system to operate efficiently.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
21.01	Follow classroom/laboratory safety rules and procedures.
21.02	Demonstrate good housekeeping at workstations within a classroom/laboratory.
21.03	Conduct classroom/laboratory activities and equipment operations in a safe manner.
21.04	Exercise care and respect for all tools, equipment, and materials.
21.05	Select appropriate tools, machines, and equipment to accomplish a given task.
21.06	Identify color-coding safety standards.
21.07	Safely use hand tools and power equipment.
21.08	Explain fire prevention and safety precautions and practices for extinguishing fires.
21.09	Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
22.0	Exhibit positive human relations and leadership skills. – The student will be able to:
22.01	Perform roles in a student personnel system or in a career and technical student organization (CTSO).
22.02	Work cooperatively with others.
31.0	Discuss educational and training requirements as they relate to various aerospace careers. – The student will be able to:
31.01	Research and identify various aerospace career choices.
31.02	Discuss individual interests related to a career.
31.03	List occupations, job requirements, and job opportunities in aerospace technology.
31.04	List occupational training programs and academic programs at the secondary/postsecondary levels in aerospace technology.
33.0	Demonstrate knowledge of the basic principles of aerostatics and aerodynamics. – The student will be able to:

CTE Standards and Benchmarks	
	33.01 Define terminology associated with aerostatics and aerodynamics.
	33.02 Explain how buoyancy principles affect an object in a fluid.
	33.03 Explain how Bernoulli's Principle applies to an object in flight.
	33.04 Identify and describe basic forces acting on an object in flight.
	33.05 Build an aerostatic vehicle.
	33.06 Build an aerodynamic vehicle.
34.0	Identify and demonstrate knowledge of both liquid and solid propellant rocket propulsion systems. – The student will be able to:
	34.01 Define technical terminology associated with propulsion systems.
	34.02 Identify parts of a solid-propellant rocket engine.
	34.03 Identify parts of a liquid-propellant rocket engine.
	34.04 Discuss the principles of rocket propulsion.
	34.05 Construct a solid- or liquid- propellant model rocket.
35.0	Define and describe the stages and forms of interference in basic satellite systems. – The student will be able to:
	35.01 Describe the basic functions and advantages of a communications satellite.
	35.02 Describe the basic functions and advantages of a weather satellite.
	35.03 Describe the basic functions and advantages of a navigation satellite.
36.0	Become familiar with the basic information provided by a sectional chart. -- The student will be able to:
	36.01 Extract and utilize information from an aeronautical chart legend.
	36.02 Identify locations on an aeronautical chart using latitude and longitude
	36.03 Differentiate between statute and nautical miles.
	36.04 Determine a course and distance between two points on an aeronautical chart using a navigational plotter.
37.0	Describe and define different categories of aviation. – The student will be able to:
	37.01 Describe military aviation and be able to identify military aircraft types and missions.
	37.02 Define general aviation (including business and executive) and be able identify general aviation aircraft types.
	37.03 Define air carrier and be able identify air carrier aircraft types.

Florida Department of Education
Student Performance Standards

Course Title: **Exploration of Transportation Technology**
Course Number: **8600240**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:
The purpose of this course is to give students an opportunity to explore the area of transportation technology and its associated careers. Students will be given the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of transportation technology on our everyday lives.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.04	Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Describe technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control systems using feedback.
02.04	Explain how technological systems can be connected to one another.
02.05	Repair malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Compare and contrast requirements or parameters placed on the development of a product or system.
02.07	Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors.
02.08	Describe different technologies that involve different sets of processes.
02.09	Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.
02.10	Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change.

CTE Standards and Benchmarks	
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	Modify the way technological systems interact with one another.
03.02	Apply a product, system, or environment developed for one setting in another setting.
03.03	Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
04.01	Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use.
04.02	Explain that technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.
04.03	Identify ethical issues associated with the development and use of technology.
04.04	Identify the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
05.01	Describe the management of waste produced by technological systems as an important societal issue.
05.02	Describe how technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
05.03	Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another.
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	Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
06.02	Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
06.03	Understand social and cultural priorities and values that are reflected in technological devices.
06.04	Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
07.01	Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
07.02	Explain how the specialization of function has been at the heart of many technological improvements.
07.03	Identify the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
07.04	Investigate how, that in the past, an invention or innovation was not usually developed with the knowledge of science.
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:

CTE Standards and Benchmarks	
	08.01 Use design as a creative planning process that leads to useful products and systems.
	08.02 Explain why there is no perfect design.
	08.03 Evaluate criteria and constraints that are requirements for a design.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
	09.01 Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
	09.02 Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
	09.03 Model, test, evaluate and modify designs to transform ideas into practical solutions.
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 Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
	10.02 Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
	10.03 Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
	11.01 Apply a design process to solve problems in and beyond the laboratory-classroom.
	11.02 Specify criteria and constraints for the design.
	11.03 Make two-dimensional and three-dimensional representations of the designed solution.
	11.04 Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
	11.05 Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
	12.01 Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
	12.02 Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
	12.03 Use computers and calculators in various applications.
	12.04 Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
	13.01 Design and use instruments to gather data.
	13.02 Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.
	13.03 Identify trends and monitor potential consequences of technological development.

CTE Standards and Benchmarks	
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
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 Define energy as the capacity to do work.
	16.02 Explain how energy can be used to do work, using many processes.
	16.03 Define power as the rate at which energy is converted from one form to another or transferred from one place to another, or the rate at which work is done.
	16.04 Describe power systems used to drive and provide propulsion to other technological products and systems.
	16.05 Explain how much of the energy used in our environment is not used efficiently.
18.0	Demonstrate an understanding of and be able to select and use transportation technologies. – The student will be able to:
	18.01 Describe how transporting people and goods involve a combination of individuals and vehicles.
	18.02 Describe subsystems of transportation vehicles, such as structural, propulsion, suspension, guidance, control, and support that must function together for a system to work effectively.
	18.03 Identify governmental regulations that influence the design and operation of transportation systems.
	18.04 Employ processes, such as receiving, holding, storing, loading, moving, unloading, delivering, evaluating, marketing, managing, communicating, and using conventions that are necessary for the entire transportation system to operate efficiently.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
	21.01 Follow classroom/laboratory safety rules and procedures.
	21.02 Demonstrate good housekeeping at workstations within a classroom/laboratory.
	21.03 Conduct classroom/laboratory activities and equipment operations in a safe manner.
	21.04 Exercise care and respect for all tools, equipment, and materials.
	21.05 Select appropriate tools, machines, and equipment to accomplish a given task.
	21.06 Identify color-coding safety standards.
	21.07 Safely use hand tools and power equipment.
	21.08 Explain fire prevention and safety precautions and practices for extinguishing fires.
	21.09 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
22.0	Exhibit positive human relations and leadership skills. – The student will be able to:
	22.01 Perform roles in a student personnel system or in a career and technical student organization (CTSO).
	22.02 Work cooperatively with others.
23.0	Discuss individual interests and aptitudes as they relate to a career. – The student will be able to:

CTE Standards and Benchmarks	
	23.01 Identify individual strengths and weaknesses.
	23.02 Discuss individual interests related to a career.
	23.03 List occupations, job requirements, and job opportunities in transportation technology.
	23.04 List occupational training programs and academic programs at the secondary/postsecondary levels in transportation technology.
38.0	Perform special skills unique to transportation technologies. – The student will be able to:
	38.01 Disassemble and reassemble or perform maintenance on a muscle-powered bicycle.
	38.02 Disassemble and reassemble or perform maintenance on a pneumatic or hydraulic device.
	38.03 Disassemble and reassemble or perform maintenance on an internal combustion engine.
	38.04 Disassemble and reassemble or perform maintenance on an electrical motor, generator, or alternator.
	38.05 Construct, maintain, or repair a land, water, or air/space vehicle.
39.0	Express knowledge of the industries that deal with transportation technology. – The student will be able to:
	39.01 Describe power and energy applications in transportation technology.
	39.02 Identify transportation products that have been developed by industries.
	39.03 List and describe transportation systems produced or used by industries.

Florida Department of Education
Student Performance Standards

Course Title: **Exploration of Power and Energy Technology**
Course Number: **8600250**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:
The purpose of this course is to give students an opportunity to explore the area of power and energy technology and its associated careers. Students will be given the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of power and energy technology on our everyday lives.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.04	Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Describe technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control systems using feedback.
02.04	Explain how technological systems can be connected to one another.
02.05	Repair malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Compare and contrast requirements or parameters placed on the development of a product or system.
02.07	Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors.
02.08	Describe different technologies that involve different sets of processes.
02.09	Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.
02.10	Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change.

CTE Standards and Benchmarks	
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	Modify the way technological systems interact with one another.
03.02	Apply a product, system, or environment developed for one setting in another setting.
03.03	Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
04.01	Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use.
04.02	Explain that technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.
04.03	Identify ethical issues associated with the development and use of technology.
04.04	Identify the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
05.01	Describe the management of waste produced by technological systems as an important societal issue.
05.02	Describe how technologies can be used to repair damage and to break down waste from the use of various products and systems.
05.03	Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another.
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	Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
06.02	Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
06.03	Understand social and cultural priorities and values that are reflected in technological devices.
06.04	Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
07.01	Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
07.02	Explain how the specialization of function has been at the heart of many technological improvements.
07.03	Identify the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
07.04	Investigate how, that in the past, an invention or innovation was not usually developed with the knowledge of science.
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:
08.01	Use design as a creative planning process that leads to useful products and systems.

CTE Standards and Benchmarks	
	08.02 Explain why there is no perfect design.
	08.03 Evaluate criteria and constraints that are requirements for a design.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
	09.01 Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
	09.02 Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
	09.03 Model, test, evaluate and modify designs to transform ideas into practical solutions.
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 Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
	10.02 Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
	10.03 Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
	11.01 Apply a design process to solve problems in and beyond the laboratory-classroom.
	11.02 Specify criteria and constraints for the design.
	11.03 Make two-dimensional and three-dimensional representations of the designed solution.
	11.04 Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
	11.05 Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
	12.01 Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
	12.02 Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
	12.03 Use computers and calculators in various applications.
	12.04 Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
	13.01 Design and use instruments to gather data.
	13.02 Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.
	13.03 Identify trends and monitor potential consequences of technological development.
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.

CTE Standards and Benchmarks	
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	Define energy as the capacity to do work.
16.02	Explain how energy can be used to do work, using many processes.
16.03	Define power as the rate at which energy is converted from one form to another or transferred from one place to another, or the rate at which work is done.
16.04	Describe power systems used to drive and provide propulsion to other technological products and systems.
16.05	Explain how much of the energy used in our environment is not used efficiently.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
21.01	Follow classroom/laboratory safety rules and procedures.
21.02	Demonstrate good housekeeping at workstations within a classroom/laboratory.
21.03	Conduct classroom/laboratory activities and equipment operations in a safe manner.
21.04	Exercise care and respect for all tools, equipment, and materials.
21.05	Select appropriate tools, machines, and equipment to accomplish a given task.
21.06	Identify color-coding safety standards.
21.07	Safely use hand tools and power equipment.
21.08	Explain fire prevention and safety precautions and practices for extinguishing fires.
21.09	Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
22.0	Exhibit positive human relations and leadership skills. – The student will be able to:
22.01	Perform roles in a student personnel system or in a career and technical student organization (CTSO).
22.02	Work cooperatively with others.
23.0	Discuss individual interests, aptitudes, and opportunities as they relate to a career. – The student will be able to:
23.01	Identify individual strengths and weaknesses.
23.02	Discuss individual interests related to a career.
23.03	List occupations, job requirements, and employment opportunities in power energy technology.
23.04	List occupational training programs and academic programs available at the secondary and postsecondary levels in power and energy technologies.
40.0	Perform special skills unique to power and energy technologies. – The student will be able to:
40.01	Disassemble and reassemble or perform maintenance on a human-powered device.

CTE Standards and Benchmarks	
	40.02 Disassemble and reassemble or perform maintenance on a pneumatic or hydraulic device.
	40.03 Disassemble and reassemble or perform maintenance on an internal combustion engine.
	40.04 Disassemble and reassemble or perform maintenance on an electrical motor, generator, or alternator.
	40.05 Construct a water-powered, wind-powered, steam-powered, thermal-powered, or solar-powered device.
41.0	Express knowledge of the industries that deal with power and energy technology. – The student will be able to:
	41.01 Identify the technologies that supply or control energy sources.
	41.02 Identify technologies that produce power systems.
	41.03 Describe power and energy applications in everyday life.
	41.04 List energy systems produced or used by industries.

Florida Department of Education
Student Performance Standards

Course Title: **Exploration of Engineering Technology**
Course Number: **8600060**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:
The purpose of this course is to give students an opportunity to explore the area of engineering technology and its associated careers. Students will be given the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of engineering technology on our everyday lives.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.04	Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Describe technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control systems using feedback.
02.04	Explain how technological systems can be connected to one another.
02.05	Repair malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Compare and contrast requirements or parameters placed on the development of a product or system.
02.07	Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors.
02.08	Describe different technologies that involve different sets of processes.
02.09	Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.
02.10	Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change.

CTE Standards and Benchmarks	
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	Modify the way technological systems interact with one another.
03.02	Apply a product, system, or environment developed for one setting in another setting.
03.03	Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
04.01	Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use.
04.02	Explain that technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.
04.03	Identify ethical issues associated with the development and use of technology.
04.04	Identify the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
05.01	Describe the management of waste produced by technological systems as an important societal issue.
05.02	Describe how technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
05.03	Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another.
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	Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
06.02	Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
06.03	Understand social and cultural priorities and values that are reflected in technological devices.
06.04	Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
07.01	Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
07.02	Explain how the specialization of function has been at the heart of many technological improvements.
07.03	Identify the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
07.04	Investigate how, that in the past, an invention or innovation was not usually developed with the knowledge of science.
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:

CTE Standards and Benchmarks	
	08.01 Use design as a creative planning process that leads to useful products and systems.
	08.02 Explain why there is no perfect design.
	08.03 Evaluate criteria and constraints that are requirements for a design.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
	09.01 Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
	09.02 Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
	09.03 Model, test, evaluate and modify designs to transform ideas into practical solutions.
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 Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
	10.02 Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
	10.03 Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
	11.01 Apply a design process to solve problems in and beyond the laboratory-classroom.
	11.02 Specify criteria and constraints for the design.
	11.03 Make two-dimensional and three-dimensional representations of the designed solution.
	11.04 Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
	11.05 Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
	12.01 Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
	12.02 Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
	12.03 Use computers and calculators in various applications.
	12.04 Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
	13.01 Design and use instruments to gather data.
	13.02 Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.
	13.03 Identify trends and monitor potential consequences of technological development.

CTE Standards and Benchmarks	
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
	21.01 Follow classroom/laboratory safety rules and procedures.
	21.02 Demonstrate good housekeeping at workstations within a classroom/laboratory.
	21.03 Conduct classroom/laboratory activities and equipment operations in a safe manner.
	21.04 Exercise care and respect for all tools, equipment, and materials.
	21.05 Select appropriate tools, machines, and equipment to accomplish a given task.
	21.06 Identify color-coding safety standards.
	21.07 Safely use hand tools and power equipment.
	21.08 Explain fire prevention and safety precautions and practices for extinguishing fires.
	21.09 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
22.0	Exhibit positive human relations and leadership skills. – The student will be able to:
	22.01 Perform roles in a student personnel system or in a career and technical student organization (CTSO).
	22.02 Work cooperatively with others.
23.0	Discuss individual interests, aptitudes, and opportunities as they relate to a career. – The student will be able to:
	23.01 Identify individual strengths and weaknesses.
	23.02 Discuss individual interests related to a career.
	23.03 List occupations, job requirements, and job opportunities in engineering technology
	23.04 List academic and career programs at the secondary levels in engineering technology.
42.0	Demonstrate skill in technical sketching and drawing as it relates to engineering design. – The student will be able to:
	42.01 Explain the concepts of technical sketching and drawing.
	42.02 Create an orthographic sketch or drawing with appropriate layout and dimensions.
	42.03 Create an isometric sketch or drawing.
43.0	Demonstrate foundational knowledge and skills associated with the design of engineering systems (e.g. mechanical, fluid, electrical systems). – The student will be able to:
	43.01 Measure and calculate dimensions of parts using metric and customary systems.
	43.02 Identify simple machines.
	43.03 Explain mechanical advantage.

CTE Standards and Benchmarks	
	43.04 Define scientific quantities that are used in engineering designs (e.g. mass, weight, force, voltage, current, resistance).
	43.05 Read and use system schematics (e.g. electrical and hydraulic circuits).
	43.06 Assemble, operate, and identify the parts of mechanical and electrical systems.
44.0	Demonstrate understanding and use of measurement tools and systems. – The student will be able to:
	44.01 Take and record both U.S customary and SI systems of measurement.
	44.02 Convert measurements using both U.S customary and SI systems of measurement.
45.0	Demonstrate an understanding of the engineering process. – The student will be able to:
	45.01 Define terminology associated with engineering products and systems.
	45.02 Describe the experimental method as it is applied to design.
	45.03 Create a model of a design solution to an engineering problem.
	45.04 Sketch a graphical or visual solution to an engineering problem.
	45.05 Present a report on an engineering design problem, concept or issue.
46.0	Demonstrate foundational knowledge and skills associated with common computer peripherals and computer functions. – The student will be able to:
	46.01 Identify and describe the various internal and external components of a computer and their functions (e.g., power supply, hard drive, RAM, mother board, I/O cards/ports, cabling, etc.).
	46.02 Identify and describe various computer input devices (e.g., USB, firewall, parallel and serial, Ethernet, printers, camera).
47.0	Demonstrate an understanding of Internet safety and ethics. – The student will be able to:
	47.01 Differentiate between viruses and malware, the impact on personal privacy and computer operation, and ways to avoid infection.
	47.02 Adhere to cyber safety practices with regard to conducting Internet searches, email, chat rooms, and other social network websites.
	47.03 Adhere to Acceptable Use Policies when accessing the Internet.
48.0	Develop fundamental business productivity software skills. The students will be able to:
	48.01 Use appropriate functions in a word processing program. (e.g. format text, insert tables, create bulleted lists)
	48.02 Describe a spreadsheet and the ways in which it may be used.
	48.03 Describe presentation software, the ways it may be used, and appropriate presentation delivery skills.
	48.04 Use appropriate functions in a presentation software program. (e.g. insert images, duplicate slides, format text)
49.0	Successfully work as a member of a team. – The student will be able to:
	49.01 Accept responsibility for specific tasks in a given situation.

CTE Standards and Benchmarks
49.02 Maintain a positive relationship with other team members.
49.03 Document progress, and provide feedback on work accomplished in a timely manner.
49.04 Complete assigned tasks in a timely and professional manner.

Florida Department of Education
Student Performance Standards

Course Title: **Exploration of Robotics Technology**
Course Number: **8600070**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:
The purpose of this course is to give students an opportunity to explore the area of robotics technology and its associated careers. Students will be given the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of robotics technology on our everyday lives.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.04	Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Describe technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control systems using feedback.
02.04	Explain how technological systems can be connected to one another.
02.05	Repair malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Compare and contrast requirements or parameters placed on the development of a product or system.
02.07	Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors.
02.08	Describe different technologies that involve different sets of processes.
02.09	Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.
02.10	Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change.

CTE Standards and Benchmarks	
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	Modify the way technological systems interact with one another.
03.02	Apply a product, system, or environment developed for one setting in another setting.
03.03	Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
04.01	Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use.
04.02	Explain that technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.
04.03	Identify ethical issues associated with the development and use of technology.
04.04	Identify the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
05.01	Describe the management of waste produced by technological systems as an important societal issue.
05.02	Describe how technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
05.03	Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another.
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	Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
06.02	Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
06.03	Understand social and cultural priorities and values that are reflected in technological devices.
06.04	Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
07.01	Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
07.02	Explain how the specialization of function has been at the heart of many technological improvements.
07.03	Identify the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
07.04	Investigate how, that in the past, an invention or innovation was not usually developed with the knowledge of science.
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:

CTE Standards and Benchmarks	
	08.01 Use design as a creative planning process that leads to useful products and systems.
	08.02 Explain why there is no perfect design.
	08.03 Evaluate criteria and constraints that are requirements for a design.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
	09.01 Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
	09.02 Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
	09.03 Model, test, evaluate and modify designs to transform ideas into practical solutions.
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 Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
	10.02 Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
	10.03 Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
	11.01 Apply a design process to solve problems in and beyond the laboratory-classroom.
	11.02 Specify criteria and constraints for the design.
	11.03 Make two-dimensional and three-dimensional representations of the designed solution.
	11.04 Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
	11.05 Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
	12.01 Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
	12.02 Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
	12.03 Use computers and calculators in various applications.
	12.04 Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
	13.01 Design and use instruments to gather data.
	13.02 Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.
	13.03 Identify trends and monitor potential consequences of technological development.

CTE Standards and Benchmarks	
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
	21.01 Follow classroom/laboratory safety rules and procedures.
	21.02 Demonstrate good housekeeping at workstations within a classroom/laboratory.
	21.03 Conduct classroom/laboratory activities and equipment operations in a safe manner.
	21.04 Exercise care and respect for all tools, equipment, and materials.
	21.05 Select appropriate tools, machines, and equipment to accomplish a given task.
	21.06 Identify color-coding safety standards.
	21.07 Safely use hand tools and power equipment.
	21.08 Explain fire prevention and safety precautions and practices for extinguishing fires.
	21.09 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
22.0	Exhibit positive human relations and leadership skills. – The student will be able to:
	22.01 Perform roles in a student personnel system or in a career and technical student organization (CTSO).
	22.02 Work cooperatively with others.
23.0	Discuss individual interests, aptitudes, and opportunities as they relate to a career. – The student will be able to:
	23.01 Identify individual strengths and weaknesses.
	23.02 Discuss individual interests related to a career.
	23.03 List occupations, job requirements, and job opportunities in robotics technology
	23.04 List academic and career programs at the secondary levels in robotics technology.
50.0	Demonstrate an understanding of robotics, its history, applications, and evolution. – The student will be able to:
	50.01 Explore robotics history through research of the industry.
	50.02 Describe various applications of automation and robotics.
	50.03 Describe emerging technologies and their implications on the field of robotics.
51.0	Demonstrate an understanding of basic programming concepts. – The student will be able to:
	51.01 Apply the engineering design process to the creation of a program
	51.02 Discuss the use of algorithms
	51.03 Demonstrate the use of flowcharting in documenting an algorithm

CTE Standards and Benchmarks	
	51.04 Demonstrate the use of pseudocode in documenting an algorithm
	51.05 Explain the function of conditional execution (eg if, if/else) and their uses
	51.06 Explain iterative programming structures (e.g., while, do/while) and their uses.
	51.07 Demonstrate the use of testing & debugging in the problem solving process
	51.08 Create functional program that satisfies prescribed criteria
52.0	Identify the basic subsystems on a robotic system. – The student will be able to:
	52.01 Define drivetrain, manipulator, and chassis
	52.02 Understand the difference between Ackermann and skid steering
	52.03 Identify the difference between Motors and servos
	52.04 Calculate simple gear ratios and their relationship with torque vs speed
	52.05 Assess the advantages and disadvantages of wheels vs tank treads
	52.06 Analyze the characteristics of a sound chassis design
53.0	Describe the role of sensors in the field of robotics. – The student will be able to:
	53.01 Define sensor.
	53.02 Describe the basic operation common to all sensors.
	53.03 Describe the types of sensors and ways in which they can be categorized.
	53.04 Investigate the types of manipulators used in a robotic system.
54.0	Build, program, and configure a robot to perform predefined tasks. – The student will be able to:
	54.01 Design a robot.
	54.02 Create programs as required using robotic software that will allow the robot to perform a set of tasks.
	54.03 Create a flow chart that visually describes a basic robotic task.
	54.04 Configure subsystems to operate the robot.
	54.05 Create a portfolio including drawings and specifications, describing the robot, the tasks and rationale, and the results.
55.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:
	55.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.
	55.02 Employ critical thinking and interpersonal skills to resolve conflicts.
	55.03 Identify and document workplace performance goals and monitor progress toward those goals.

CTE Standards and Benchmarks
55.04 Conduct technical research to gather information necessary for decision-making.

Florida Department of Education
Student Performance Standards

Course Title: **Exploration of Technical Design Technology**
Course Number: **8600090**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:
The purpose of this course is to give students an opportunity to explore the area of technical design technology and its associated careers. Students will be given the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of technical design technology on our everyday lives.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.04	Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Describe technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control systems using feedback.
02.04	Explain how technological systems can be connected to one another.
02.05	Repair malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Compare and contrast requirements or parameters placed on the development of a product or system.
02.07	Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors.
02.08	Describe different technologies that involve different sets of processes.
02.09	Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.
02.10	Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change.

CTE Standards and Benchmarks	
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	Modify the way technological systems interact with one another.
03.02	Apply a product, system, or environment developed for one setting in another setting.
03.03	Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
04.01	Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use.
04.02	Explain that technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.
04.03	Identify ethical issues associated with the development and use of technology.
04.04	Identify the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
05.01	Describe the management of waste produced by technological systems as an important societal issue.
05.02	Describe how technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
05.03	Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another.
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	Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
06.02	Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
06.03	Understand social and cultural priorities and values that are reflected in technological devices.
06.04	Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
07.01	Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
07.02	Explain how the specialization of function has been at the heart of many technological improvements.
07.03	Identify the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
07.04	Investigate how, that in the past, an invention or innovation was not usually developed with the knowledge of science.
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:

CTE Standards and Benchmarks	
	08.01 Use design as a creative planning process that leads to useful products and systems.
	08.02 Explain why there is no perfect design.
	08.03 Evaluate criteria and constraints that are requirements for a design.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
	09.01 Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
	09.02 Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
	09.03 Model, test, evaluate and modify designs to transform ideas into practical solutions.
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 Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
	10.02 Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
	10.03 Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
	11.01 Apply a design process to solve problems in and beyond the laboratory-classroom.
	11.02 Specify criteria and constraints for the design.
	11.03 Make two-dimensional and three-dimensional representations of the designed solution.
	11.04 Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
	11.05 Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
	12.01 Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
	12.02 Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
	12.03 Use computers and calculators in various applications.
	12.04 Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
	13.01 Design and use instruments to gather data.
	13.02 Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.
	13.03 Identify trends and monitor potential consequences of technological development.

CTE Standards and Benchmarks	
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
	21.01 Follow classroom/laboratory safety rules and procedures.
	21.02 Demonstrate good housekeeping at workstations within a classroom/laboratory.
	21.03 Conduct classroom/laboratory activities and equipment operations in a safe manner.
	21.04 Exercise care and respect for all tools, equipment, and materials.
	21.05 Select appropriate tools, machines, and equipment to accomplish a given task.
	21.06 Identify color-coding safety standards.
	21.07 Safely use hand tools and power equipment.
	21.08 Explain fire prevention and safety precautions and practices for extinguishing fires.
	21.09 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
22.0	Exhibit positive human relations and leadership skills. – The student will be able to:
	22.01 Perform roles in a student personnel system or in a career and technical student organization (CTSO).
	22.02 Work cooperatively with others.
23.0	Discuss individual interests, aptitudes, and opportunities as they relate to a career. – The student will be able to:
	23.01 Identify individual strengths and weaknesses.
	23.02 Discuss individual interests related to a career.
	23.03 List occupations, job requirements, and job opportunities in technical design technology
	23.04 List academic and career programs at the secondary levels in technical design technology.
56.0	Demonstrate technical skills and applications common to all types of drafting–The student will be able to:
	56.01 Apply lettering techniques.
	56.02 Make freehand sketches.
	56.03 Use drafting symbols and alphabet of lines in accordance with technical standards and practices.
	56.04 Apply measuring techniques using decimals and fractions.
	56.05 Apply industry standard dimensioning techniques.
	56.06 Apply geometric construction techniques.
	56.07 Interpret information from drawings, prints, and sketches.

CTE Standards and Benchmarks	
	56.08 Apply coordinate systems.
57.0	Demonstrate technical knowledge and skills for making basic orthographic drawings–The student will be able to:
	57.01 Describe orthographic projection.
	57.02 Identify the six principal views of an object.
	57.03 Produce a three-view orthographic drawing using traditional drafting methods.
58.0	Demonstrate technical knowledge and skills for making pictorial drawings–The student will be able to:
	58.01 Explain methods of pictorial drawing.
	58.02 Produce an isometric drawing using traditional drafting methods.
	58.03 Produce an oblique drawing using traditional drafting methods.
	58.04 Produce a perspective drawing using traditional drafting methods.
59.0	Demonstrate technical knowledge and skills for making a three-dimensional study model–The student will be able to:
	59.01 Produce a conceptual sketch.
	59.02 Produce a three-dimensioned model.

Florida Department of Education
Student Performance Standards

Course Title: **Exploration of Electronics Technology**
Course Number: **8600091**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:
The purpose of this course is to give students an opportunity to explore the area of electronics technology and its associated careers. Students will be given the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of electronics technology on our everyday lives.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.04	Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Describe technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control systems using feedback.
02.04	Explain how technological systems can be connected to one another.
02.05	Repair malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Compare and contrast requirements or parameters placed on the development of a product or system.
02.07	Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors.
02.08	Describe different technologies that involve different sets of processes.
02.09	Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.
02.10	Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change.

CTE Standards and Benchmarks	
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	Modify the way technological systems interact with one another.
03.02	Apply a product, system, or environment developed for one setting in another setting.
03.03	Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
04.01	Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use.
04.02	Explain that technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.
04.03	Identify ethical issues associated with the development and use of technology.
04.04	Identify the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
05.01	Describe the management of waste produced by technological systems as an important societal issue.
05.02	Describe how technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
05.03	Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another.
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	Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
06.02	Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
06.03	Understand social and cultural priorities and values that are reflected in technological devices.
06.04	Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
07.01	Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
07.02	Explain how the specialization of function has been at the heart of many technological improvements.
07.03	Identify the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
07.04	Investigate how, that in the past, an invention or innovation was not usually developed with the knowledge of science.
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:

CTE Standards and Benchmarks	
	08.01 Use design as a creative planning process that leads to useful products and systems.
	08.02 Explain why there is no perfect design.
	08.03 Evaluate criteria and constraints that are requirements for a design.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
	09.01 Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
	09.02 Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
	09.03 Model, test, evaluate and modify designs to transform ideas into practical solutions.
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 Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
	10.02 Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
	10.03 Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
	11.01 Apply a design process to solve problems in and beyond the laboratory-classroom.
	11.02 Specify criteria and constraints for the design.
	11.03 Make two-dimensional and three-dimensional representations of the designed solution.
	11.04 Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
	11.05 Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
	12.01 Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
	12.02 Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
	12.03 Use computers and calculators in various applications.
	12.04 Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
	13.01 Design and use instruments to gather data.
	13.02 Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.
	13.03 Identify trends and monitor potential consequences of technological development.

CTE Standards and Benchmarks	
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
	21.01 Follow laboratory safety rules and procedures.
	21.02 Demonstrate good housekeeping at workstations within a total laboratory.
	21.03 Conduct laboratory activities and equipment operations in a safe manner.
	21.04 Identify tools, machines, materials and equipment and describe their functions.
	21.05 Select appropriate tools, machines, and equipment to accomplish a given task.
	21.06 Demonstrate safe and correct use of tools, machines, and equipment.
	21.07 Identify color-coding safety standards.
	21.08 Explain fire prevention and safety precautions and practices for extinguishing fires.
	21.09 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
	21.10 Identify the factors that determine the severity of electrical shock.
	21.11 Identify lifesaving safety equipment such as ground fault circuit interrupters (GFCI), proper grounding.
	21.12 Identify protective equipment such as circuit breakers, fuses, surge protection, and uninterruptable power supplies.
	21.13 Compare the characteristics and applications of different types of batteries. (Lithium, NiCad, Alkaline, etc.)
	21.14 Explain ways in which batteries are rated and texted.
22.0	Exhibit positive human relations and leadership skills. – The student will be able to:
	22.01 Perform roles in a student personnel system or in a career and technical student organization (CTSO).
	22.02 Work cooperatively with others.
23.0	Discuss individual interests, aptitudes, and opportunities as they relate to a career. – The student will be able to:
	23.01 Identify individual strengths and weaknesses.
	23.02 Discuss individual interests related to a career.
	23.03 List occupations, job requirements, and job opportunities in electronics technology
	23.04 List academic and career programs at the secondary levels in electronics technology.
60.0	Demonstrate an understanding of the nature of electricity. – The student will be able to:
	60.01 Identify parts of an atom.
	60.02 Describe how the interaction of charged particles in the atom creates electron flow.

CTE Standards and Benchmarks	
	60.03 Evaluate whether a material is a conductor, insulator, or semiconductor based upon its number of valance electrons and its position on the periodic table.
	60.04 Explain the difference between current, voltage and resistance.
	60.05 Describe the properties of a magnet including polarity.
	60.06 Identify the primary parts of a DC motor and demonstrate how it functions.
	60.07 Identify the primary parts of a generator and demonstrate how it functions.
	60.08 Compare and contrast the characteristics of a basic motor and generator.
	60.09 Describe the composition of elements, mixtures, and compounds according to the electron theory.
	60.10 Diagram and show the relationship between electrons, protons, and neutrons.
	60.11 State the law of electrical charges.
	60.12 Define electrical quantities (voltage, current, resistance, etc.).
	60.13 Define units of measure including milli, micro, mega, and kilo.
61.0	Explore the basics of electric circuits. – The student will be able to:
	61.01 Identify the characteristics of series, parallel, and combination electrical circuits.
	61.02 Sketch circuit diagrams using standardized schematic symbols.
	61.03 Construct physical electrical circuits based upon circuit diagrams.
	61.04 Measure voltage, current, and resistance using a multimeter.
	61.05 Mathematically calculate voltage, current, and resistance using Ohm’s law.
	61.06 Integrate DC sources, lamps, switches, diodes, light emitting diodes, resistors, and capacitors into electrical circuits to achieve specific functions.
	61.07 Determine the value of a fixed resistor based upon the color codes on those resistors.
62.0	Investigate digital signals and basic digital components. – The student will be able to:
	62.01 Identify the relationship between the binary number system and the decimal number system and convert binary numbers to decimal.
	62.02 Describe the functions of NOT, AND, OR, NAND, NOR, and XOR gates.
	62.03 Create truth tables for logic scenarios and match those gates to truth tables.
	62.04 Create a digital wave form and graph it for a binary sequence.
	62.05 Determine the logic, sensors, gates, outputs, and other components needed to emulate existing electronic devices that utilize logic.
63.0	Demonstrate and apply proper use of electronic equipment. – The student will be able to:

CTE Standards and Benchmarks	
63.01	Use a digital or analog volt-ohm meter (VOM) to obtain accurate measurements.
63.02	Apply safety rules in the use of electronic instruments and demonstrate proper care and maintenance for the equipment during storage and use.
63.03	Use voltmeters, ammeters, and ohmmeters to obtain accurate measurements.
63.04	Set up and use an oscilloscope to observe waveforms and to determine the voltage of the signal presented.
63.05	Use signal generators to produce waveforms of selected frequencies and shapes.
63.06	Use testers to determine the condition of electronic components.
64.0	Demonstrate proper electronic assembly methods. – The student will be able to:
64.01	Exhibit safe soldering techniques.
64.02	Identify proper soldering practices.
64.03	Demonstrate proper soldering applications.
64.04	Identify common electrical and electronics hand tools.
64.05	Demonstrate electronic component assembly.
64.06	Apply electrical tape to a spliced and soldered wire connection.
64.07	Solder and de-solder components and wires.
64.08	Describe the two methods of making a printed circuit board.

Florida Department of Education
Student Performance Standards

Course Title: **Exploration of Maritime Technology**
Course Number: **8600092**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:
The purpose of this course is to give students an opportunity to explore the area of maritime technology and its associated careers. Students will be given the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of maritime technology on our everyday lives.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.04	Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Describe technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control systems using feedback.
02.04	Explain how technological systems can be connected to one another.
02.05	Repair malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Compare and contrast requirements or parameters placed on the development of a product or system.
02.07	Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors.
02.08	Describe different technologies that involve different sets of processes.
02.09	Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.
02.10	Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change.

CTE Standards and Benchmarks	
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	Modify the way technological systems interact with one another.
03.02	Apply a product, system, or environment developed for one setting in another setting.
03.03	Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
04.01	Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use.
04.02	Explain that technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.
04.03	Identify ethical issues associated with the development and use of technology.
04.04	Identify the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
05.01	Describe the management of waste produced by technological systems as an important societal issue.
05.02	Describe how technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
05.03	Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another.
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	Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
06.02	Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
06.03	Understand social and cultural priorities and values that are reflected in technological devices.
06.04	Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
07.01	Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
07.02	Explain how the specialization of function has been at the heart of many technological improvements.
07.03	Identify the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
07.04	Investigate how, that in the past, an invention or innovation was not usually developed with the knowledge of science.
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:

CTE Standards and Benchmarks	
	08.01 Use design as a creative planning process that leads to useful products and systems.
	08.02 Explain why there is no perfect design.
	08.03 Evaluate criteria and constraints that are requirements for a design.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
	09.01 Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
	09.02 Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
	09.03 Model, test, evaluate and modify designs to transform ideas into practical solutions.
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 Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
	10.02 Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
	10.03 Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
	11.01 Apply a design process to solve problems in and beyond the laboratory-classroom.
	11.02 Specify criteria and constraints for the design.
	11.03 Make two-dimensional and three-dimensional representations of the designed solution.
	11.04 Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
	11.05 Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
	12.01 Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
	12.02 Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
	12.03 Use computers and calculators in various applications.
	12.04 Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
	13.01 Design and use instruments to gather data.
	13.02 Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.
	13.03 Identify trends and monitor potential consequences of technological development.

CTE Standards and Benchmarks	
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
	21.01 Follow classroom/laboratory safety rules and procedures.
	21.02 Demonstrate good housekeeping at workstations within a classroom/laboratory.
	21.03 Conduct classroom/laboratory activities and equipment operations in a safe manner.
	21.04 Exercise care and respect for all tools, equipment, and materials.
	21.05 Select appropriate tools, machines, and equipment to accomplish a given task.
	21.06 Identify color-coding safety standards.
	21.07 Safely use hand tools and power equipment.
	21.08 Explain fire prevention and safety precautions and practices for extinguishing fires.
	21.09 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
22.0	Exhibit positive human relations and leadership skills. – The student will be able to:
	22.01 Perform roles in a student personnel system or in a career and technical student organization (CTSO).
	22.02 Work cooperatively with others.
23.0	Discuss individual interests, aptitudes, and opportunities as they relate to a career. – The student will be able to:
	23.01 Identify individual strengths and weaknesses.
	23.02 Discuss individual interests related to a career.
	23.03 List occupations, job requirements, and job opportunities in maritime technology
	23.04 List academic and career programs at the secondary levels in maritime technology.
65.0	Demonstrate knowledge relating to the historical origins of the maritime industry from vessel development, cultural, and trade perspectives. -- The student will be able to:
	65.01 Identify different types of ships and their origins.
	65.02 Create a timeline showing significant milestones in maritime history.
	65.03 Describe the significance of the Phoenicians, Vikings, and Asians on maritime cultures and traditions.
	65.04 Identify changes in sea going trade over the centuries.
	65.05 Describe the effect of trade on colonialism and the developing world.
66.0	Demonstrate proficiency in understanding the various career paths in the maritime industry. -- The student will be able to:
	66.01 Identify important factors to choosing a career.

CTE Standards and Benchmarks	
	66.02 Explain the importance of planning for a career.
	66.03 Evaluate the impact of education on long term career success.
	66.04 Research and investigate career paths in the maritime industry.
	66.05 Describe the skills and personal qualities needed for maritime careers.
	66.06 Describe the everyday life of people working in maritime careers.
	66.07 Describe the future growth trends of maritime careers.
	66.08 Create a personal maritime career path based on interest.
67.0	Demonstrate an understanding of required skills sets by mariners including, safety training, regulations, and leadership. -- The student will be able to:
	67.01 Create a timeline explaining the evolution of the U.S. Coast Guard.
	67.02 Explain the main functions of the U.S. Coast Guard.
	67.03 Describe the U.S. Coast Guard and its place in the U.S. military.
	67.04 Describe the organization and leadership hierarchy on a vessel.
	67.05 Explain Master's Level of Authority.
	67.06 Describe the importance of leadership and chain-of-command on a vessel.
	67.07 Use seamanship skills to tie knots, identify equipment, and practice safe work methods.
	67.08 Describe the process of watch keeping, navigation, boat handling, anchoring, and mooring.
	67.09 Use seamanship terminology.
68.0	Demonstrate proficiency in using engineering methods for ship construction and design. -- The student will be able to:
	68.01 Identify and describe various types of marine engines.
	68.02 Explain the phenomenon of wind generation.
	68.03 Explain how wind has been used to propel ships.
	68.04 Describe the process and instrumentation for measuring and calculating wind power.
	68.05 Describe the principles of buoyancy.
	68.06 Explain the relationship between weight, volume, and density.
	68.07 Explain Archimedes Principal.
	68.08 Explain how a ship made of steel is able to float.
	68.09 Construct a model vessel from material with a density greater than 1 and ensure it floats.

CTE Standards and Benchmarks	
	68.10 Use the engineering process to create solutions for a maritime related problem.
	68.11 Work in teams to using the engineering process to create solutions for a maritime problem.
69.0	Identify and explain various vessels and their and their use. -- The student will be able to:
	69.01 Identify various types of ships.
	69.02 Explain specific reasons for different types of ships.
	69.03 Describe different types of cargo vessels and cargo types.
	69.04 Describe different types of passenger vessels and their purpose
70.0	Evaluate the environmental impact of the maritime industry--The student will be able to:
	70.01 Explain the role of maritime in protection of the environment.
	70.02 Describe the environmental regulations on the maritime industry.
71.0	Examine the potential and use of marine resources. -- The student will be able to:
	71.01 Identify various energy sources related to the marine environment.
	71.02 Describe how solar energy can be used to provide power for ships.
	71.03 Provide three examples of solar power use in the maritime industry.
	71.04 Explain how power could be generated from currents.
	71.05 Describe how energy can be created from tidal movements and what technology is used to perform this function.
72.0	Demonstrate an understanding of oceanography concepts--The student will be able to:
	72.01 Explain oceanography's role as a marine science disciple and its areas of investigation.
	72.02 Explain how ocean currents form and their role in distribution of heat.
	72.03 Describe the various types of tides and why they are monitored throughout the maritime industry.
	72.04 Evaluate the difference between tides, currents, and waves.
	72.05 Compare the El Nino and la Nina events and their impact on weather.
	72.06 Identify various ways wave energy is created and how it moves through the ocean.
	72.07 Apply mathematics to waves to solve for wave height and wave length.
	72.08 Explain the Coriolis Effect.
	72.09 Describe the theory of global warming and how humans have contributed to associated maritime events.
73.0	Demonstrate an understanding of the fundamentals of marine biology--The student will be able to:

CTE Standards and Benchmarks	
73.01	Describe how freshwater collects on the earth’s surface and its relation to the oceans.
73.02	Explain the ecological importance of mangroves in water filtration and runoff.
73.03	Explain the role of mangroves in high energy events and environmental concerns for their removal.
73.04	Identify and explain the importance of estuaries.

Florida Department of Education
Student Performance Standards

Course Title: **Exploration of Logistics and Supply Chain Technology**
Course Number: **8600093**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:
The purpose of this course is to give students an opportunity to explore the area of logistics and supply chain technology and its associated careers. Students will be given the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of logistics and supply chain technology on our everyday lives.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.04	Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Describe technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control systems using feedback.
02.04	Explain how technological systems can be connected to one another.
02.05	Repair malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Compare and contrast requirements or parameters placed on the development of a product or system.
02.07	Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors.
02.08	Describe different technologies that involve different sets of processes.
02.09	Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.
02.10	Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change.

CTE Standards and Benchmarks	
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	Modify the way technological systems interact with one another.
03.02	Apply a product, system, or environment developed for one setting in another setting.
03.03	Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
04.01	Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use.
04.02	Explain that technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.
04.03	Identify ethical issues associated with the development and use of technology.
04.04	Identify the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
05.01	Describe the management of waste produced by technological systems as an important societal issue.
05.02	Describe how technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
05.03	Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another.
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	Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
06.02	Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
06.03	Understand social and cultural priorities and values that are reflected in technological devices.
06.04	Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
07.01	Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
07.02	Explain how the specialization of function has been at the heart of many technological improvements.
07.03	Identify the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
07.04	Investigate how, that in the past, an invention or innovation was not usually developed with the knowledge of science.
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:

CTE Standards and Benchmarks	
	08.01 Use design as a creative planning process that leads to useful products and systems.
	08.02 Explain why there is no perfect design.
	08.03 Evaluate criteria and constraints that are requirements for a design.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
	09.01 Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
	09.02 Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
	09.03 Model, test, evaluate and modify designs to transform ideas into practical solutions.
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 Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
	10.02 Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
	10.03 Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
	11.01 Apply a design process to solve problems in and beyond the laboratory-classroom.
	11.02 Specify criteria and constraints for the design.
	11.03 Make two-dimensional and three-dimensional representations of the designed solution.
	11.04 Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
	11.05 Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
	12.01 Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
	12.02 Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
	12.03 Use computers and calculators in various applications.
	12.04 Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
	13.01 Design and use instruments to gather data.
	13.02 Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.
	13.03 Identify trends and monitor potential consequences of technological development.

CTE Standards and Benchmarks	
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
	21.01 Follow classroom/laboratory safety rules and procedures.
	21.02 Demonstrate good housekeeping at workstations within a classroom/laboratory.
	21.03 Conduct classroom/laboratory activities and equipment operations in a safe manner.
	21.04 Exercise care and respect for all tools, equipment, and materials.
	21.05 Select appropriate tools, machines, and equipment to accomplish a given task.
	21.06 Identify color-coding safety standards.
	21.07 Safely use hand tools and power equipment.
	21.08 Explain fire prevention and safety precautions and practices for extinguishing fires.
	21.09 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
22.0	Exhibit positive human relations and leadership skills. – The student will be able to:
	22.01 Perform roles in a student personnel system or in a career and technical student organization (CTSO).
	22.02 Work cooperatively with others.
23.0	Discuss individual interests, aptitudes, and opportunities as they relate to a career. – The student will be able to:
	23.01 Identify individual strengths and weaknesses.
	23.02 Discuss individual interests related to a career.
	23.03 List occupations, job requirements, and job opportunities in logistics and supply chain technology
	23.04 List academic and career programs at the secondary levels in logistics and supply chain technology.
74.0	Demonstrate an understanding of global logistics and supply chain. -- The student will be able to:
	74.01 Discuss the history, career fields, and benefits of the global supply chain industry.
	74.02 Describe principal elements of the logistics environment and logistics systems.
	74.03 Explore career pathways within global logistics and supply chain.
	74.04 Explain ways in which handling of product throughout supply chain logistics affects company’s viability and profitability.
	74.05 Define basic principles of just-in-time purchasing and inventory control.
	74.06 Identify major security requirements applicable to the logistics environment.
	74.07 Cite examples of environmental and financial impacts of logistics activities.

CTE Standards and Benchmarks	
75.0	Demonstrate an understanding of transportation systems. -- The student will be able to:
75.01	Identify various transportation modes.
75.02	Describe and contrast the different modes of transportation and their advantages/disadvantages.
75.03	List the main considerations in determining the best mode.
75.04	Describe and assess global freight transportation systems.
76.0	Demonstrate professional communication skills. -- The student will be able to:
76.01	Identify effective communications to both internal and external customers.
76.02	Identify ways to elicit clear statements of customer requirements and specifications.
76.03	Demonstrate an understanding of teamwork and good professional workplace behavior to solve problems.
76.04	List characteristics of an effective team member.
76.05	Explain ways to set team goals.
76.06	Identify use of team environment to solve problems and resolve conflicts.
76.07	Describe typical requirements for good workplace conduct.
77.0	Demonstrate customer service skills. -- The student will be able to:
77.01	Exhibit acceptable workplace dress or attire.
77.02	Exhibit punctuality, initiative, courtesy, loyalty, and honesty.
77.03	Use a personality inventory for personal improvement.
77.04	Exhibit the ability to get along with others.
77.05	Discuss the importance of human relations.
77.06	Develop and demonstrate the unique human relations skills needed for successful entry and progress in the customer service occupations or marketing occupations selected as a career objective.
77.07	Differentiate between an acceptable and an unacceptable code of business ethical conduct.
78.0	Demonstrate an understanding of warehouse operations. -- The student will be able to:
78.01	Identify and discuss the characteristics, purpose and importance of warehouse operations and supply chain management.
78.02	Define material handling logistics as it applies to the warehousing function.
78.03	Define "logical" in terms of the term logistics.
78.04	Define movement in a warehouse and identify the various locations within the warehouse where planned efficient movement of materials takes place.
78.05	Explain channels of distribution.

CTE Standards and Benchmarks	
78.06	Discuss safety regulatory requirements and procedures.
78.07	Identify various types of equipment available to enhance the efficient movement of materials within a warehouse.
78.08	Identify the various types of loading docks and cross docking.
78.09	Define the term "peaks and valleys" as it applies to warehouse activity.
78.10	Explain the importance of staging and JIT.
78.11	Identify the primary types of hand-operated pieces of warehouse equipment.
78.12	Explain the concept of "balancing" as it applies to counterbalanced lift trucks.
78.13	Identify warehouse documents (e.g., pick tickets, special orders, inventory forms).
79.0	Demonstrate an understanding of storage and control operations--The student will be able to:
79.01	Explain the concepts involved in determining the best method for storage and the equipment needed to facilitate a cost effective and efficient warehouse.
79.02	Identify the factors that are involved with the calculating and estimating of the storage area needed for retention of materials in a warehouse.
79.03	Define the following storage related terms: Size, Volume, Density, Pallet, and Case.
79.04	Define the terms packaging, SKU, stacking frame, term "Logistics Execution Systems" (LES), signage and signposting, "real time" and barcoding.
79.05	Explain how the volume of materials, space usage, and control affect the design of storage space in a warehouse design.
79.06	Explain inventories and their importance.
79.07	Identify and analyze various warehouse storage systems.
79.08	Identify the basic configuration for pallet rack.
79.09	Identify the various types of technologies developed over the years to keep track of goods within the warehouse.
79.10	Define the components of an LES.
79.11	Define radio frequency identification (RFID).
79.12	Explain the importance of automation in warehousing.
79.13	Identify the value of emerging technologies related to warehouse operations.

Florida Department of Education
Student Performance Standards

Course Title: **Exploration of Green Construction and Architecture Technology**
Course Number: **8600094**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:
The purpose of this course is to give students an opportunity to explore the area of green construction and architecture technology and its associated careers. Students will be given the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of green construction and architecture technology on our everyday lives.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.04	Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Describe technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control systems using feedback.
02.04	Explain how technological systems can be connected to one another.
02.05	Repair malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Compare and contrast requirements or parameters placed on the development of a product or system.
02.07	Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors.
02.08	Describe different technologies that involve different sets of processes.
02.09	Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.
02.10	Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change.

CTE Standards and Benchmarks	
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	Modify the way technological systems interact with one another.
03.02	Apply a product, system, or environment developed for one setting in another setting.
03.03	Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
04.01	Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use.
04.02	Explain that technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.
04.03	Identify ethical issues associated with the development and use of technology.
04.04	Identify the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
05.01	Describe the management of waste produced by technological systems as an important societal issue.
05.02	Describe how technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
05.03	Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another.
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	Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
06.02	Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
06.03	Understand social and cultural priorities and values that are reflected in technological devices.
06.04	Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
07.01	Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
07.02	Explain how the specialization of function has been at the heart of many technological improvements.
07.03	Identify the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
07.04	Investigate how, that in the past, an invention or innovation was not usually developed with the knowledge of science.
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:

CTE Standards and Benchmarks	
	08.01 Use design as a creative planning process that leads to useful products and systems.
	08.02 Explain why there is no perfect design.
	08.03 Evaluate criteria and constraints that are requirements for a design.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
	09.01 Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
	09.02 Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
	09.03 Model, test, evaluate and modify designs to transform ideas into practical solutions.
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 Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
	10.02 Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
	10.03 Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
	11.01 Apply a design process to solve problems in and beyond the laboratory-classroom.
	11.02 Specify criteria and constraints for the design.
	11.03 Make two-dimensional and three-dimensional representations of the designed solution.
	11.04 Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
	11.05 Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
	12.01 Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
	12.02 Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
	12.03 Use computers and calculators in various applications.
	12.04 Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
	13.01 Design and use instruments to gather data.
	13.02 Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.
	13.03 Identify trends and monitor potential consequences of technological development.

CTE Standards and Benchmarks	
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
	21.01 Follow classroom/laboratory safety rules and procedures.
	21.02 Demonstrate good housekeeping at workstations within a classroom/laboratory.
	21.03 Conduct classroom/laboratory activities and equipment operations in a safe manner.
	21.04 Exercise care and respect for all tools, equipment, and materials.
	21.05 Select appropriate tools, machines, and equipment to accomplish a given task.
	21.06 Identify color-coding safety standards.
	21.07 Safely use hand tools and power equipment.
	21.08 Explain fire prevention and safety precautions and practices for extinguishing fires.
	21.09 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
22.0	Exhibit positive human relations and leadership skills. – The student will be able to:
	22.01 Perform roles in a student personnel system or in a career and technical student organization (CTSO).
	22.02 Work cooperatively with others.
23.0	Discuss individual interests, aptitudes, and opportunities as they relate to a career. – The student will be able to:
	23.01 Identify individual strengths and weaknesses.
	23.02 Discuss individual interests related to a career.
	23.03 List occupations, job requirements, and job opportunities in green construction and architectural technology
	23.04 List academic and career programs at the secondary levels in green construction and architectural technology.
80.0	Demonstrate an understanding of the built environment. -- The student will be able to:
	80.01 Research the development of construction technology, its impact on the built environment and the impact of growth on the construction industry.
	80.02 Examine and compare the relationship between the built environment and the natural environment.
	80.03 Compare architectural designs and/or models to understand how technical and functional components impact aesthetic qualities.
	80.04 Analyze changes in architectural styles and construction practices over time.
	80.05 Research innovative historical architectural and/or engineering works and examine the significance of their legacy for the future.
81.0	Demonstrate an understanding of the green environment. -- The student will be able to:

CTE Standards and Benchmarks	
	81.01 Recognize and analyze the development of the built environment and its impacts on the natural environment such as pollution, deforestation, climate change, health and disease.
	81.02 Describe and give examples of how a green built environment creates growth for the construction industry, and the economy such as health and safety, transportation and natural resources.
	81.03 Examine and compare the relationship between a green built environment and the natural environment.
	81.04 Explain the purpose of the United States Green Building Council (USGBC), the Green Building Certification Institute (GBCI) and Leadership for Energy and Environmental Design (LEED) are and how they create growth for the construction industry and the economy.
	81.05 Research sustainable building design and its relationship between health, energy efficiency and money savings for government, businesses and individuals.
	81.06 Research the effects of building science on construction and energy efficiency.
	81.07 Research renewable fuels and energy.
82.0	Use building laws and codes, style, convenience, cost, climate, and function to select building designs. – The student will be able to:
	82.01 Identify the function and types of building foundations.
	82.02 Identify the subsystems contained in buildings.
	82.03 Summarize energy efficient building materials and processes.
83.0	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. -- The student will be able to:
	83.01 Apply a systematic process to determine to meet the criteria and constraints of the problem.
	83.02 Make two-dimensional and three-dimensional representations of the designed solution
	83.03 Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
	83.04 Apply a design process to solve problems in or beyond the laboratory-classroom.
	83.05 Summarize energy efficient building materials and processes.
	83.06 Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved
84.0	Describe the human impact on the environment and identify ways to minimize environmental impacts. -- The student will be able to:
	84.01 Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
	84.02 Construct an argument supported by evidence for how increases in human population and per capita consumption of natural resources impact Earth's systems.
	84.03 Analyze recycling opportunities for building construction and materials.
	84.04 Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

CTE Standards and Benchmarks	
85.0	Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions and accurately measure drawing dimensions. -- The student will be able to:
85.01	Construct geometric figures including but not limited to triangles, squares, rectangles, and circles.
85.02	Solve real-world and mathematical problems involving area, volume, perimeter, and surface area of two- and three-dimensional objects composed of geometric figures including but not limited to triangles, quadrilaterals, polygons, cubes, and right prisms. Identify the subsystems contained in buildings.
85.03	Solve real-world and mathematical problems involving area, volume, perimeter, and surface area of two- and three-dimensional objects composed of geometric figures including but not limited to triangles, quadrilaterals, polygons, cubes, and right prisms.
85.04	Use a ruler and an architectural scale to measure and create drawings and produce scale drawings a building.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

MyCareerShines is an interactive resource to assist students in identifying their ideal career and to enhance preparation for employment. Teachers are encouraged to integrate this resource into the program curriculum to meet the employability goals for each student.

Career and Technical Student Organization (CTSO)

The Florida Technology Student Association (FL-TSA) is the intercurricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. 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.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Florida Department of Education
Curriculum Framework

Course Title: **Exploration of Production Technology and Career Planning***
Course Type: **Orientation/Exploratory and Career Planning**
Career Cluster: **Engineering & Technology Education**

Secondary – Middle School	
Course Number	8600042
CIP Number	08210122CE
Grade Level	6 – 8
Standard Length	Semester
Teacher Certification	Refer to the **Course Structure** section.
CTSO	FL-TSA

*Effective July 1, 2017, there is no longer a promotion requirement for middle grades students to complete a Career and Education Planning course. However, these courses will continue to be available and should be taught integrating the eight career and education planning course standards. The MyCareerShines powered by Kuder® career planning system is available free of charge to all Florida middle and high schools to assist students in exploring career options and developing an academic and career plan.

Purpose

The purpose of this course is to assist students in making informed decisions regarding their future academic and occupational goals and to provide information regarding careers in the Engineering and Technology Education career cluster. The content includes but is not limited to providing the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of production technology on our everyday lives. Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Course Structure

The length of this course is one semester. It may be offered for two semesters when appropriate. When offered for one semester, it is recommended that it be at the exploratory level and more in-depth when offered for two semesters.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the course structure:

Course Number	Course Title	Teacher Certification	Length
8600042	Exploration of Production Technology and Career Planning	AUTO PROD 7G BLDG CONST @7 7G BLDG MAINT @7 7G CARPENTRY @7 7G ENG 7G ENG TEC 7G METAL WORK 7G PLTW PTE 7G TEC CONSTR @7 7G TEC ED 1 @2 ENG&TEC ED1@2	Semester

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate an understanding of the characteristics and scope of technology.
02.0 Demonstrate an understanding of the core concepts of technology.
03.0 Demonstrate an understanding of the relationships among technologies and the connection between technology and other fields of study.
04.0 Demonstrate an understanding of the cultural, social, economic, and political effects of technology.
05.0 Demonstrate an understanding of the effects of technology on the environment.
06.0 Demonstrate an understanding of the role of society in the development and use of technology.
07.0 Demonstrate an understanding of the influence of history on technology.
08.0 Demonstrate an understanding of the attributes of design.
09.0 Demonstrate an understanding of 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 manufacturing technologies.
15.0 Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials.
16.0 Exhibit positive human relations and leadership skills.
17.0 Discuss individual interests, aptitudes, and opportunities as they relate to a career.
18.0 Identify evolving technologies of production systems.
19.0 Perform special skills unique to manufacturing technology.
20.0 Express knowledge of factors that impact manufacturing technology and practices.

Listed below are the eight career and education planning course standards.

21.0 Describe the influences that societal, economic, and technological changes have on employment trends and future training.
22.0 Develop skills to locate, evaluate, and interpret career information.
23.0 Identify and demonstrate processes for making short and long term goals.
24.0 Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship.
25.0 Understand the relationship between educational achievement and career choices/postsecondary options.
26.0 Identify a career cluster and related pathways through an interest assessment that match career and education goals.
27.0 Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
28.0 Demonstrate knowledge of technology and its application in career fields/clusters.

Florida Department of Education
Student Performance Standards

Course Title: **Exploration of Production Technology and Career Planning**
Course Number: **8600042**
Course Length: **Semester**

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.04	Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Describe technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control system using feedback.
02.04	Explain how technological systems can be connected to one another.
02.05	Repair malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Compare and contrast requirements or parameters placed on the development of a product or system.
02.07	Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors.
02.08	Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.
02.09	Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change.
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	Modify the way technological systems interact with one another.
03.02	Apply a product, system, or environment developed for one setting in another setting.

CTE Standards and Benchmarks	
	03.03 Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
	04.01 Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use.
	04.02 Explain that technology, by itself, is neither good nor bad, but decisions about the use of products and systems can result in desirable or undesirable consequences.
	04.03 Identify ethical issues associated with the development and use of technology.
	04.04 Identify the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
	05.01 Describe the management of waste produced by technological systems as an important societal issue.
	05.02 Describe how technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
	05.03 Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another.
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 Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
	06.02 Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
	06.03 Understand social and cultural priorities and values that are reflected in technological devices.
	06.04 Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of history on technology. – The student will be able to:
	07.01 Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
	07.02 Explain how the specialization of function has been at the heart of many technological improvements.
	07.03 Identify the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
	07.04 Explain that in the past, an invention or innovation was not usually developed with the knowledge of science.
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:
	08.01 Use design as a creative planning process that leads to useful products and systems.

CTE Standards and Benchmarks	
	08.02 Explain why there is no perfect design.
	08.03 Evaluate criteria and constraints that are requirements for a design.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
	09.01 Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
	09.02 Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
	09.03 Model, test, evaluate and modify designs to transform ideas into practical solutions.
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 Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
	10.02 Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
	10.03 Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
	11.01 Apply a design process to solve problems in and beyond the laboratory-classroom.
	11.02 Specify criteria and constraints for the design.
	11.03 Make two-dimensional and three-dimensional representations of the designed solution.
	11.04 Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
	11.05 Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
	12.01 Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
	12.02 Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
	12.03 Use computers and calculators in various applications.
	12.04 Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:

CTE Standards and Benchmarks	
	13.01 Design and use instruments to gather data.
	13.02 Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.
	13.03 Identify trends and monitor potential consequences of technological development.
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
14.0	Demonstrate an understanding of and be able to select and use manufacturing technologies. – The student will be able to:
	14.01 Describe manufacturing systems using mechanical processes that change the form of materials through processes of separating, forming, combining, and conditioning them.
	14.02 Classify manufactured goods as durable and non-durable.
	14.03 Employ the manufacturing process including the designing, development, making, and servicing of products and systems.
	14.04 Describe manufacturing technologies that are used to modify or alter manufactured products.
	14.05 Explain that materials must first be located before they can be extracted from the earth through processes such as harvesting, drilling, and mining.
15.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
	15.01 Follow laboratory safety rules and procedures.
	15.02 Demonstrate good housekeeping at workstations within a total laboratory.
	15.03 Conduct laboratory activities and equipment operations in a safe manner.
	15.04 Exercise care and respect for all tools, equipment, and materials.
	15.05 Select appropriate tools, machines, and equipment to accomplish a given task.
	15.06 Identify color-coding safety standards.
	15.07 Safely use hand tools and power equipment.
	15.08 Explain fire prevention and safety precautions and practices for extinguishing fires.
	15.09 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
16.0	Exhibit positive human relations and leadership skills. – The student will be able to:
	16.01 Perform roles in a student personnel system or in the Florida Technology Student Association (FL-TSA).

CTE Standards and Benchmarks	
	16.02 Work cooperatively with others.
17.0	Discuss individual interests, aptitudes, and opportunities as they relate to a career. – The student will be able to:
	17.01 Identify individual strengths and weaknesses.
	17.02 Discuss individual interests related to a career.
	17.03 List occupations, job requirements, and job opportunities in production technology.
	17.04 List occupational training programs and academic programs at the secondary/postsecondary levels in production technology.
18.0	Identify evolving technologies of production systems. – The student will be able to:
	18.01 List evolving technologies of manufacturing and construction industries.
	18.02 Discuss the evolution of technologies related to manufacturing systems and construction processes.
	18.03 Brainstorm futuristic production systems.
19.0	Perform special skills unique to manufacturing technology--The student will be able to:
	19.01 Design a product for custom or mass production manufacturing.
	19.02 Plan a mass production system for manufacturing a product.
	19.03 Perform materials forming practices such as casting or molding, and compressing or stretching.
	19.04 Perform materials separating practices such as shearing, chip removing, and other separating processes.
	19.05 Perform materials conditioning practices such as heat treating, physical conditioning, or through chemical reactions.
	19.06 Combine components through mixing, coating, bonding, and mechanical fastening.
	19.07 Assemble a product or a subassembly of a product.
20.0	Express knowledge of factors that impact manufacturing technology and practices--The student will be able to:
	20.01 Explain economic factors that impact on manufacturing technology.
	20.02 Research and identify consumer demands for a manufactured product.
	20.03 Identify sources of raw materials and/or standard stock materials needed for a manufactured product.
	20.04 Interview, hire, train, or promote an applicant or employee for a simulated mass production manufacturing activity.

CTE Standards and Benchmarks	
	20.05 Define the terms "organized labor" and "collective bargaining."
	20.06 Prepare a plan for marketing and distributing a manufactured product.
Listed below are the eight career and education planning course standards: The student will be able to**:**	
21.0	Describe the influences that societal, economic, and technological changes have on employment trends and future training.
22.0	Develop skills to locate, evaluate, and interpret career information.
23.0	Identify and demonstrate processes for making short and long term goals.
24.0	Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship.
25.0	Understand the relationship between educational achievement and career choices/postsecondary options.
26.0	Identify a career cluster and related pathways through an interest assessment that match career and education goals.
27.0	Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
28.0	Demonstrate knowledge of technology and its application in career fields/clusters.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

MyCareerShines is an interactive resource to assist students in identifying their ideal career and to enhance preparation for employment. Teachers are encouraged to integrate this resource into the program curriculum to meet the employability goals for each student.

Career and Technical Student Organization (CTSO)

The Florida Technology Student Association (FL-TSA) is the intercurricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. 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.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Florida Department of Education
Curriculum Framework

Course Title: **Exploring Technology and Career Planning***
Course Type: **Orientation/Exploratory and Career Planning**
Career Cluster: **Engineering & Technology Education**

Secondary – Middle School	
Course Number	8600220
CIP Number	08210122CP
Grade Level	6 – 8
Standard Length	Semester
Teacher Certification	Refer to the **Course Structure** section
CTSO	FL-TSA

*Effective July 1, 2017, there is no longer a promotion requirement for middle grades students to complete a Career and Education Planning course. However, these courses will continue to be available and should be taught integrating the eight career and education planning course standards. The MyCareerShines powered by Kuder® career planning system is available free of charge to all Florida middle and high schools to assist students in exploring career options and developing an academic and career plan.

Purpose

The purpose of this course is to give students an opportunity to explore the area of production technology and its associated careers. Course requirements are consistent with 8600020 Exploring Technology with the addition of the career and education planning course requirements. Students will be given the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of production technology on our everyday lives.

The purpose of this course is to assist students in making informed decisions regarding their future academic and occupational goals and to provide information regarding careers in the Engineering and Technology Education career cluster. The content includes but is not limited to providing the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of production technology on our everyday lives. Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Course Structure

The length of this course is one semester. It may be offered for two semesters when appropriate. When offered for one semester, it is recommended that it be at the exploratory level and more in-depth when offered for two semesters.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the course structure:

Course Number	Course Title	Teacher Certification	Length
8600220	Exploring Technology and Career Planning	ENG 7G ENG TEC 7G PLTW PTE 7G TEC ED 1 @2 ENG&TEC ED1@2	Semester

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate an understanding of the characteristics and scope of technology.
02.0 Demonstrate an understanding of the core concepts of technology.
03.0 Demonstrate an understanding of the relationships among technologies and the connection between technology and other fields of study.
04.0 Demonstrate an understanding of the cultural, social, economic, and political effects of technology.
05.0 Demonstrate an understanding of the effects of technology on the environment.
06.0 Demonstrate an understanding of the role of society in the development and use of technology.
07.0 Demonstrate an understanding of the influence of history on technology.
08.0 Demonstrate an understanding of the attributes of design.
09.0 Demonstrate an understanding of 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.
21.0 Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials.
22.0 Exhibit positive human relations and leadership skills.
23.0 Discuss individual interests, aptitudes, and opportunities as they relate to a career.

Listed below are the eight career and education planning course standards.

24.0 Describe the influences that societal, economic, and technological changes have on employment trends and future training.
25.0 Develop skills to locate, evaluate, and interpret career information.
26.0 Identify and demonstrate processes for making short and long term goals.
27.0 Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship.
28.0 Understand the relationship between educational achievement and career choices/postsecondary options.
29.0 Identify a career cluster and related pathways that match career and education goals.
30.0 Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
31.0 Demonstrate knowledge of technology and its application in career fields/clusters.

Florida Department of Education
Student Performance Standards

Course Title: **Exploring Technology and Career Planning**
Course Number: **8600220**
Course Length: **Semester**

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.04	Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Describe technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control systems using feedback.
02.04	Explain how technological systems can be connected to one another.
02.05	Repair malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Compare and contrast requirements or parameters placed on the development of a product or system.
02.07	Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors.
02.08	Describe different technologies that involve different sets of processes.
02.09	Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.
02.10	Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change.
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	Modify the way technological systems interact with one another.

CTE Standards and Benchmarks	
	03.02 Apply a product, system, or environment developed for one setting in another setting.
	03.03 Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
	04.01 Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use.
	04.02 Explain that technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.
	04.03 Identify ethical issues associated with the development and use of technology.
	04.04 Identify the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
	05.01 Describe the management of waste produced by technological systems as an important societal issue.
	05.02 Describe how technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
	05.03 Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another.
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 Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
	06.02 Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
	06.03 Understand social and cultural priorities and values that are reflected in technological devices.
	06.04 Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of history on technology. – The student will be able to:
	07.01 Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
	07.02 Explain how the specialization of function has been at the heart of many technological improvements.
	07.03 Identify the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
	07.04 Investigate how, that in the past, an invention or innovation was not usually developed with the knowledge of science.
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:

CTE Standards and Benchmarks	
	08.01 Use design as a creative planning process that leads to useful products and systems.
	08.02 Explain why there is no perfect design.
	08.03 Evaluate criteria and constraints that are requirements for a design.
	08.04 Demonstrate the ability to properly identify different resources used in projects.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
	09.01 Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
	09.02 Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
	09.03 Model, test, evaluate and modify designs to transform ideas into practical solutions.
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 Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
	10.02 Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
	10.03 Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
	11.01 Apply a design process to solve problems in and beyond the laboratory-classroom.
	11.02 Specify criteria and constraints for the design.
	11.03 Make two-dimensional and three-dimensional representations of the designed solution.
	11.04 Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
	11.05 Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
	12.01 Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
	12.02 Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
	12.03 Use computers and calculators in various applications.

CTE Standards and Benchmarks	
12.04	Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
13.01	Design and use instruments to gather data.
13.02	Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.
13.03	Identify trends and monitor potential consequences of technological development.
13.04	Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
14.0	Demonstrate an understanding of and be able to select and use medical technologies. – The student will be able to:
14.01	Describe how advances and innovations in medical technologies are used to improve healthcare.
14.02	Describe how sanitation processes used in the disposal of medical products help to protect people from harmful organisms and disease, and shape the ethics of medical safety.
14.03	Explain how the vaccines developed for use in immunization require specialized technologies to support environments in which a sufficient amount of vaccines are produced.
14.04	Describe genetic engineering involving modifying the structure of DNA to produce novel genetic make-ups.
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	Describe technological advances in agriculture directly affecting the time and number of people required to produce food for a large population.
15.02	Describe how a wide range of specialized equipment and practices is used to improve the production of food, fiber, fuel, and other useful products and in the care of animals.
15.03	Explain how biotechnology applies the principles of biology to create commercial products or processes.
15.04	Create artificial ecosystems that are human-made complexes that replicate some aspects of natural environments.
15.05	Explain how the development of refrigeration, freezing, dehydration, preservation, and irradiation provide long-term storage of food and reduce the health risks caused by tainted food.
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	Define energy as the capacity to do work.
16.02	Explain how energy can be used to do work, using many processes.
16.03	Define power as the rate at which energy is converted from one form to another or transferred from one place to another, or the rate at which work is done.
16.04	Describe power systems used to drive and provide propulsion to other technological products and systems.

CTE Standards and Benchmarks	
	16.05 Explain how much of the energy used in our environment is not used efficiently.
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 Create information and communication systems that allow information to be transferred from human to human, human to machine, machine to machine, and machine to human.
	17.02 Describe communication systems made up of a source, encoder, transmitter, receiver, decoder, and destination.
	17.03 Consider factors that influence the design of a message, such as the intended audience, medium, purpose, and nature of the message.
	17.04 Use symbols, measurements, and drawings to promote clear communication by providing a common language to express ideas.
18.0	Demonstrate an understanding of and be able to select and use transportation technologies. – The student will be able to:
	18.01 Describe how transporting people and goods involve a combination of individuals and vehicles.
	18.02 Describe subsystems of transportation vehicles, such as structural, propulsion, suspension, guidance, control, and support that must function together for a system to work effectively.
	18.03 Summarize processes, such as receiving, holding, storing, loading, moving, unloading, delivering, evaluating, marketing, managing, communicating, and using conventions are necessary for the entire transportation system to operate efficiently.
	18.04 Describe how governmental regulations often influence the design and operation of transportation systems.
19.0	Demonstrate an understanding of and be able to select and use manufacturing technologies. – The student will be able to:
	19.01 Describe manufacturing systems using mechanical processes that change the form of materials through processes of separating, forming, combining, and conditioning them.
	19.02 Classify manufactured goods as durable and non-durable.
	19.03 Employ the manufacturing process including the designing, development, making, and servicing of products and systems.
	19.04 Describe manufacturing technologies that are used to modify or alter manufactured products.
	19.05 Explain that materials must first be located before they can be extracted from the earth through processes such as harvesting, drilling, and mining.
20.0	Demonstrate an understanding of and be able to select and use construction technologies. – The student will be able to:
	20.01 Research building laws and codes.
	20.02 Identify factors such as style, convenience, cost, climate, and function in the selection of designs for structures.
	20.03 Explain that structures rest on a foundation.
	20.04 Classify structures as temporary or permanent.

CTE Standards and Benchmarks	
	20.05 Describe subsystems of a building.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
	21.01 Follow classroom/laboratory safety rules and procedures.
	21.02 Demonstrate good housekeeping at workstations within a total laboratory.
	21.03 Conduct classroom/laboratory activities and equipment operations in a safe manner.
	21.04 Exercise care and respect for all tools, equipment, and materials.
	21.05 Select appropriate tools, machines, and equipment to accomplish a given task.
	21.06 Identify color-coding safety standards.
	21.07 Safely use hand tools and power equipment.
	21.08 Explain fire prevention and safety precautions and practices for extinguishing fires.
	21.09 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
22.0	Exhibit positive human relations and leadership skills--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 Work cooperatively with others.
23.0	Discuss individual interests, aptitudes, and opportunities as they relate to a career--The student will be able to:
	23.01 Identify individual strengths and weaknesses.
	23.02 Discuss individual interests related to a career.
	23.03 Identify careers within specific areas of technology.
	23.04 Explore careers within specific areas of interest.
	23.05 Form an understanding and appreciation for work after listening to or observing technology workers.
	23.06 Form an understanding and appreciation for work after participating in a simulated technology group project in the laboratory.
	23.07 Form an understanding and appreciation for the roles and work of co-workers.

CTE Standards and Benchmarks	
Listed below are the eight career and education planning course standards: The student will be able to**:**	
24.0	Describe the influences that societal, economic, and technological changes have on employment trends and future training.
25.0	Develop skills to locate, evaluate, and interpret career information.
26.0	Identify and demonstrate processes for making short and long term goals.
27.0	Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship.
28.0	Understand the relationship between educational achievement and career choices/postsecondary options.
29.0	Identify a career cluster and related pathways through an interest assessment that match career and education goals.
30.0	Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
31.0	Demonstrate knowledge of technology and its application in career fields/clusters.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

MyCareerShines is an interactive resource to assist students in identifying their ideal career and to enhance preparation for employment. Teachers are encouraged to integrate this resource into the program curriculum to meet the employability goals for each student.

Career Planning

The requirements of section 1003.4156 (1) (e), Florida Statutes, have been integrated into this course. The statute requires that students take a career and education planning course that must result in a completed personalized academic and career plan for the student; must emphasize the importance of entrepreneurship skills; must emphasize technology or the application of technology in career fields; and, beginning in the 2014-2015 academic year, must provide information from the Department of Economic Opportunity's economic security report as described in section 445.07, Florida Statutes.

Career and Technical Student Organization (CTSO)

The Florida Technology Student Association (FL-TSA) is the intercurricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. 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.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Florida Department of Education
Curriculum Framework

Program Title: **Integrated Technology Studies and Career Planning***
Program Type: **Orientation/Exploratory**
Career Cluster: **Engineering & Technology Education**

Secondary – Middle School	
Program Number	8600360
CIP Number	08210101MS
Grade Level	6 – 8
Standard Length	Semester
Teacher Certification	Refer to the **Program Structure** section
CTSO	FL-TSA

*Effective July 1, 2017, there is no longer a promotion requirement for middle grades students to complete a Career and Education Planning course. However, these courses will continue to be available and should be taught integrating the eight career and education planning course standards. The MyCareerShines powered by Kuder® career planning system is available free of charge to all Florida middle and high schools to assist students in exploring career options and developing an academic and career plan.

Purpose

The purpose of this program is to provide students with a foundation of knowledge and technically oriented experiences in the study of the applications of technology and its effect upon our lives and the choosing of an occupation. The content and activities will also include the study of safety, and leadership skills. This program focuses on transferable skills and stresses understanding and demonstration of the technological tools, machines, instruments, materials, processes and systems in business and industry.

The emphasis of this program is on developing awareness of future needs, developing technological competence, confidence and awareness through interaction with technologies, developing awareness of other career programs, interacting with business, industry and community organizations, applying basic skills in learning activities, and developing self-awareness of individual abilities, needs and interests. The courses are intended to help students develop their problem-solving skills and creativity while learning about technology and careers in the Engineering & Technology Education career cluster. Students will learn to gather data through research and testing, as well as to document their results and processes.

The content includes introductory studies in areas of technology which introduce students to the development of abilities to calculate, make important observation's, analyze and solve problems using manipulative skills while working cooperatively with others in team activities.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program contains a series of instructional courses listed below.
The lengths of these courses are one semester. They may be offered for two semesters when appropriate. When offered for one semester, it is recommended that the course be at the exploratory level and more in-depth when offered for two semesters.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the course structure:

Course Number	Course Title	Teacher Certification	Length
8600012	Introduction to Technology and Career Planning	ENG 7G ENG TEC 7G PLTW PTE 7G TEC ED 1 @2 ENG&TEC ED1@2	Semester
8600220	Exploring Technology and Career Planning		Semester
8600032	Exploration of Communications Technology and Career Planning	COMM ART @7 7G ENG 7G GRAPH ARTS @4 PRINTING @7 7G TEC ED 1 @2 ENG&TEC ED1@2	Semester
8600042	Exploration of Production Technology and Career Planning	AUTO PROD 7G BLDG CONST @7 7G BLDG MAINT @7 7G CARPENTRY @7 7G ENG 7G ENG TEC 7G METALWORK 7G PLTW PTE 7G TEC CONSTR @7 7G TEC ED 1 @2 ENG&TEC ED1@2	Semester
8600052	Exploration of Aerospace Technology and Career Planning	AEROSPACE 7G ENG 7G ENG TEC 7G PLTW PTE 7G TEC ED 1 @2 ENG&TEC ED1@2	Semester

Course Number	Course Title	Teacher Certification	Length
8600242	Exploration of Transportation Technology and Career Planning	AIR MECH @7 7G AUTO IND @7 %7 %G AUTO MECH @7 7G DIESEL MECH @7 7G ENG 7G GASENG RPR @7 7G TEC ED 1 @2 ENG&TEC ED1@2 TEC MECH 7G TRANSPORT 7G	Semester
8600252	Exploration of Power and Energy Technology and Career Planning	AUTO IND @7 %7 %G AUTO MECH @7 7G DIESEL MECH @7 7G ENG 7G GASENG RPR @7 7G TEC ED 1 @2 ENG&TEC ED1@2 TEC MECH 7G TRANSPORT 7G	Semester
8600062	Exploration of Engineering Technology and Career Planning	ENG 7G ENG TEC 7G PLTW PTE 7G TEC ED 1 @2 ENG&TEC ED1@2	Semester
8600072	Exploration of Robotics Technology and Career Planning	ENG 7G ENG TEC 7G ROBOTICS 7G TEC ED 1 @2 ENG&TEC ED1@2	Semester
8600082	Exploration of Technical Design Technology and Career Planning	DRAFTING @7 7G ENG 7G ENG TEC 7G GRAPH ARTS @4 PLTW PTE 7G TEC ED 1 @2 ENG&TEC ED1@2	Semester
8600095	Exploration of Electronics Technology and Career Planning	ELECTRICAL @7 7G ELECTRONIC @7 7G ENG 7G ENG TEC 7G PLTW PTE 7G	Semester

Course Number	Course Title	Teacher Certification	Length
		TEC ED 1 @2 ENG&TEC ED1@2 TEC ELEC @7 7G	
8600096	Exploration of Maritime Technology and Career Planning	ENG 7G ENG TEC 7G SEAMANSHIP 7G TEC ED 1 @2 ENG&TEC ED1@2	Semester
8600097	Exploration of Logistics and Supply Chain Technology and Career Planning	BUS ED 1 ENG 7G ENG TEC 7G LOG TECH 7G TEC ED 1 @2 ENG&TEC ED1@2	Semester
8600098	Exploration of Green Construction and Architecture Technology and Career Planning	BLDG CONST @7 7G BLDG MAINT @7 7G CARPTENTRY @7 7G DRAFTING @7 7G ENG 7G ENG TEC 7G PLTW PTE 7G TEC CONSTR @7 7G TEC DRAFT 7G TEC ED 1 @2 ENG&TEC ED1@2 WOODWORKIN @4	Semester

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate an understanding of the characteristics and scope of technology.
02.0 Demonstrate an understanding of the core concepts of technology.
03.0 Demonstrate an understanding of the relationships among technologies and the connection between technology and other fields of study.
04.0 Demonstrate an understanding of the cultural, social, economic, and political effects of technology.
05.0 Demonstrate an understanding of the effects of technology on the environment.
06.0 Demonstrate an understanding of the role of society in the development and use of technology.
07.0 Demonstrate an understanding of the influence of technology on history.
08.0 Demonstrate an understanding of the attributes of design.
09.0 Demonstrate an understanding of 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 communications 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.
21.0 Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials.
22.0 Exhibit positive human relations and leadership skills.
23.0 Discuss individual interests, aptitudes, and opportunities as they relate to a career.

Listed below are the eight career and education planning course standards.

24.0 Describe the influences that societal, economic, and technological changes have on employment trends and future training.
25.0 Develop skills to locate, evaluate, and interpret career information.
26.0 Identify and demonstrate processes for making short and long term goals.
27.0 Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship.
28.0 Understand the relationship between educational achievement and career choices/postsecondary options.
29.0 Identify a career cluster and related pathways that match career and education goals.
30.0 Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
31.0 Demonstrate knowledge of technology and its application in career fields/clusters.

Exploration of Communications Technology

32.0 Demonstrate an application of basic digital publishing techniques.
33.0 Identify and describe the major types of printing techniques used in print production.
34.0 Identify and demonstrate the role of electronic communication.
35.0 Identify and demonstrate the role of optical technology.

Exploration of Production Technology

36.0 Identify evolving technologies of Production Systems.
37.0 Perform special skills unique to Manufacturing Technology.
38.0 Express knowledge of factors that impact Manufacturing Technologies and practices.

Exploration of Aerospace Technology

39.0 Discuss educational and training requirements as they relate to various aerospace careers.
40.0 Demonstrate an understanding of and be able to select and use aerospace technologies.
41.0 Demonstrate knowledge of the basic principles of aerostatics and aerodynamics.
42.0 Identify and demonstrate knowledge of both liquid and solid propellant rocket propulsion systems.
43.0 Define and describe the stages and forms of interference in basic satellite communication systems.
44.0 Become familiar with the basic information provided by a sectional chart.
45.0 Describe and define different categories of aviation.

Exploration of Transportation Technology

46.0 Perform special skills unique to transportation technologies.
47.0 Express knowledge of the industries that deal with transportation technology.

Exploration of Power and Energy Technology

48.0 Perform special skills unique to power and energy technologies.
49.0 Express knowledge of the industries that deal with power and energy technology.

Exploration of Engineering Technology

50.0 Demonstrate skill in technical sketching and drawing as it relates to engineering design.
51.0 Demonstrate foundational knowledge and skills associated with the design of engineering systems (e.g. mechanical, fluid, electrical systems).
52.0 Demonstrate understanding and use of measurement tools and systems.
53.0 Demonstrate an understanding of the engineering process.
54.0 Demonstrate foundational knowledge and skills associated with common computer peripherals and computer functions.
55.0 Demonstrate an understanding of Internet safety and ethics.
56.0 Develop fundamental business productivity software skills.
57.0 Successfully work as a member of a team.

Exploration of Robotics Technology

58.0 Demonstrate an understanding of robotics, its history, applications, and evolution.
59.0 Demonstrate an understanding of basic programming concepts.

60.0 Identify the basic subsystems on a robotic system.
61.0 Describe the role of sensors in the field of robotics.
62.0 Build, program, and configure a robot to perform predefined tasks.
63.0 Solve problems using critical thinking skills, creativity and innovation.

Exploration of Technical Design Technology

64.0 Demonstrate technical skills and applications common to all types of drafting.
65.0 Demonstrate technical knowledge and skills for making basic orthographic drawings.
66.0 Demonstrate technical knowledge and skills for making pictorial drawings.
67.0 Demonstrate technical knowledge and skills for making a three-dimensional study model.

Exploration of Electronics Technology

68.0 Demonstrate an understanding of the nature of electricity.
69.0 Explore the basics of electric circuits.
70.0 Investigate digital signals and basic digital components.
71.0 Demonstrate and apply proper use of electronic equipment.
72.0 Demonstrate proper electronic assembly methods.

Exploration of Maritime Technology

73.0 Demonstrate knowledge relating to the historical origins of the maritime industry from vessel development, cultural, and trade perspectives.
74.0 Demonstrate proficiency in understanding the various career paths in the maritime industry.
75.0 Demonstrate an understanding of required skills sets by mariners including, safety training, regulations, and leadership.
76.0 Demonstrate proficiency in using engineering methods for ship construction and design.
77.0 Identify and explain various vessels and their and their use.
78.0 Evaluate the environmental impact of the maritime industry.
79.0 Examine the potential and use of marine resources.
80.0 Demonstrate an understanding of oceanography concepts.
81.0 Demonstrate an understanding of the fundamentals of marine biology.

Exploration of Logistics and Supply Chain Technology

82.0 Demonstrate an understanding of global logistics and supply chain.
83.0 Demonstrate an understanding of transportation systems.
84.0 Demonstrate professional communication skills.
85.0 Demonstrate customer service skills.
86.0 Demonstrate an understanding of warehouse operations.
87.0 Demonstrate an understanding of storage and control operations.

Exploration of Green Construction and Architecture Technology

88.0 Demonstrate an understanding of the built environment.
89.0 Demonstrate an understanding of the green environment.
90.0 Use building laws and codes, style, convenience, cost, climate, and function to select building designs.

91.0 Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
92.0 Describe the human impact on the environment and identify ways to minimize environmental impacts.
93.0 Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions and accurately measure drawing dimensions.

Florida Department of Education
Student Performance Standards

Course Title: **Introduction to Technology and Career Planning**
Course Number: **8600012**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:

The purpose of this course is to give students an introduction to the areas of technology and to introduce students to the design and problem solving processes using manipulative skills while working cooperatively with others in team activities.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Identify technological systems including input, processes, output, and, at times, feedback.
02.02	Define systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control system using feedback.
02.04	Identify how technological systems can be connected to one another.
02.05	Diagnose malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Identify requirements or parameters placed on the development of a product or system.
02.07	Identify trade-offs as a decision process recognizing the need for careful compromises among competing factors.
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	Explain how technological systems interact with one another.
03.02	Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:

CTE Standards and Benchmarks	
	04.01 Describe ethical issues associated with the development and use of technology.
	04.02 Describe the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
	05.01 Describe the management of waste produced by technological systems as an important societal issue.
	05.02 Identify how technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
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 Identify changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
	06.02 Understand how social and cultural priorities and values are reflected in technological devices.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
	07.01 Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
	07.02 Explain how the specialization of function has been at the heart of many technological improvements.
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:
	08.01 Use design as a creative planning process that leads to useful products and systems.
	08.02 Explain why there is no perfect design.
	08.03 Identify criteria and constraints that are requirements for a design.
	08.04 Demonstrate the ability to properly identify different resources used in projects.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
	09.01 Identify the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
	09.02 Define brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
	09.03 Model, test, evaluate and modify designs to transform ideas into practical solutions.
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 Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
	10.02 Define invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
	10.03 Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
	11.01 Apply a design process to solve problems in and beyond the laboratory-classroom.

CTE Standards and Benchmarks	
	11.02 Specify criteria and constraints for the design.
	11.03 Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
	11.04 Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
	12.01 Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
	12.02 Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
	12.03 Use computers and calculators in various applications.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
	13.01 Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.
	13.02 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
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 advances and innovations in medical technologies are used to improve healthcare.
	14.02 Explain how the vaccines developed for use in immunization require specialized technologies to support environments in which a sufficient amount of vaccines are produced.
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 technological advances in agriculture directly affecting the time and number of people required to produce food for a large population.
	15.02 Explain how biotechnology applies the principles of biology to create commercial products or processes.
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 Define energy as the capacity to do work.
	16.02 Explain how energy can be used to do work, using many processes.
	16.03 Define power systems used to drive and provide propulsion to other technological products and systems.
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 information and communication systems that allow information to be transferred from human to human, human to machine, machine to machine, and machine to human.
	17.02 Define communication systems made up of a source, encoder, transmitter, receiver, decoder, and destination.
18.0	Demonstrate an understanding of and be able to select and use transportation technologies. – The student will be able to:
	18.01 Describe how transporting people and goods involve a combination of individuals and vehicles.
	18.02 Identify subsystems of transportation vehicles, such as structural, propulsion, suspension, guidance, control, and support that must

CTE Standards and Benchmarks	
	function together for a system to work effectively.
19.0	Demonstrate an understanding of and be able to select and use manufacturing technologies. – The student will be able to:
19.01	Define manufacturing systems using mechanical processes that change the form of materials through processes of separating, forming, combining, and conditioning them.
19.02	Classify manufactured goods as durable and non-durable.
19.03	Define manufacturing technologies that are used to modify or alter manufactured products.
19.04	Explain that materials must first be located before they can be extracted from the earth through processes such as harvesting, drilling, and mining.
20.0	Demonstrate an understanding of and be able to select and use construction technologies. – The student will be able to:
20.01	Identify factors such as style, convenience, cost, climate, and function in the selection of designs for structures.
20.02	Explain that structures rest on a foundation.
20.03	Classify structures as temporary or permanent.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
21.01	Follow classroom/laboratory safety rules and procedures.
21.02	Demonstrate good housekeeping at workstations within a classroom/laboratory.
21.03	Conduct classroom/laboratory activities and equipment operations in a safe manner.
21.04	Exercise care and respect for all tools, equipment, and materials.
21.05	Identify color-coding safety standards.
21.06	Safely use hand tools and power equipment.
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	Exhibit positive human relations and leadership skills. – The student will be able to:
22.01	Perform roles in a student personnel system or in a career and technical student organization (CTSO).
22.02	Work cooperatively with others.
23.0	Discuss individual interests, aptitudes, and opportunities as they relate to a career. – The student will be able to:
23.01	Describe individual strengths and weaknesses.
23.02	Discuss individual interests related to a career.
23.03	Identify careers within specific areas of technology.

CTE Standards and Benchmarks	
	23.04 Explore careers within specific areas of interest.
Listed below are the eight career and education planning course standards: The student will be able to**:**	
24.0	Describe the influences that societal, economic, and technological changes have on employment trends and future training.
25.0	Develop skills to locate, evaluate, and interpret career information.
26.0	Identify and demonstrate processes for making short and long term goals.
27.0	Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship.
28.0	Understand the relationship between educational achievement and career choices/postsecondary options.
29.0	Identify a career cluster and related pathways through an interest assessment that match career and education goals.
30.0	Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
31.0	Demonstrate knowledge of technology and its application in career fields/clusters.

Florida Department of Education
Student Performance Standards

Course Title: **Exploring Technology and Career Planning**
Course Number: **8600220**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:

The purpose of this course is to give students an opportunity to explore the areas of technology and associated careers available in technical fields. Students will be given the opportunity to solve technological problems while gaining an understanding of the effects of technology on our everyday lives.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.04	Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Describe technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control systems using feedback.
02.04	Explain how technological systems can be connected to one another.
02.05	Repair malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Compare and contrast requirements or parameters placed on the development of a product or system.
02.07	Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors.
02.08	Describe different technologies that involve different sets of processes.
02.09	Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.

CTE Standards and Benchmarks	
	02.10 Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change.
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 Modify the way technological systems interact with one another.
	03.02 Apply a product, system, or environment developed for one setting in another setting.
	03.03 Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
	04.01 Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use.
	04.02 Explain that technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.
	04.03 Identify ethical issues associated with the development and use of technology.
	04.04 Identify the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
	05.01 Describe the management of waste produced by technological systems as an important societal issue.
	05.02 Describe how technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
	05.03 Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another.
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 Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
	06.02 Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
	06.03 Understand social and cultural priorities and values that are reflected in technological devices.
	06.04 Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
	07.01 Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
	07.02 Explain how the specialization of function has been at the heart of many technological improvements.
	07.03 Identify how the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
	07.04 Investigate how, that in the past, an invention or innovation was not usually developed with the knowledge of science.

CTE Standards and Benchmarks	
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:
08.01	Use design as a creative planning process that leads to useful products and systems.
08.02	Explain why there is no perfect design.
08.03	Evaluate criteria and constraints that are requirements for a design.
08.04	Demonstrate the ability to properly identify different resources used in projects.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
09.01	Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
09.02	Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
09.03	Model, test, evaluate and modify designs to transform ideas into practical solutions.
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	Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
10.02	Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
10.03	Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
11.01	Apply a design process to solve problems in and beyond the laboratory-classroom.
11.02	Specify criteria and constraints for the design.
11.03	Make two-dimensional and three-dimensional representations of the designed solution.
11.04	Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
11.05	Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
12.01	Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
12.02	Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
12.03	Use computers and calculators in various applications.
12.04	Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
13.01	Design and use instruments to gather data.

CTE Standards and Benchmarks	
	13.02 Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.
	13.03 Identify trends and monitor potential consequences of technological development.
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
14.0	Demonstrate an understanding of and be able to select and use medical technologies. – The student will be able to:
	14.01 Describe how advances and innovations in medical technologies are used to improve healthcare.
	14.02 Describe how sanitation processes used in the disposal of medical products help to protect people from harmful organisms and disease, and shape the ethics of medical safety.
	14.03 Explain how the vaccines developed for use in immunization require specialized technologies to support environments in which a sufficient amount of vaccines are produced.
	14.04 Describe genetic engineering involving modifying the structure of DNA to produce novel genetic make-ups.
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 Describe technological advances in agriculture directly affecting the time and number of people required to produce food for a large population.
	15.02 Describe how a wide range of specialized equipment and practices is used to improve the production of food, fiber, fuel, and other useful products and in the care of animals.
	15.03 Explain how biotechnology applies the principles of biology to create commercial products or processes.
	15.04 Create artificial ecosystems that are human-made complexes that replicate some aspects of natural environments.
	15.05 Explain how the development of refrigeration, freezing, dehydration, preservation, and irradiation provide long-term storage of food and reduce the health risks caused by tainted food.
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 Define energy as the capacity to do work.
	16.02 Explain how energy can be used to do work, using many processes.
	16.03 Define power as the rate at which energy is converted from one form to another or transferred from one place to another, or the rate at which work is done.
	16.04 Describe power systems used to drive and provide propulsion to other technological products and systems.
	16.05 Explain how much of the energy used in our environment is not used efficiently.
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 Create information and communication systems that allow information to be transferred from human to human, human to machine, machine to machine, and machine to human.
	17.02 Describe communication systems made up of a source, encoder, transmitter, receiver, decoder, and destination.
	17.03 Consider factors that influence the design of a message, such as the intended audience, medium, purpose, and nature of the message.

CTE Standards and Benchmarks	
	17.04 Use symbols, measurements, and drawings to promote clear communication by providing a common language to express ideas.
18.0	Demonstrate an understanding of and be able to select and use transportation technologies. – The student will be able to:
	18.01 Describe how transporting people and goods involve a combination of individuals and vehicles.
	18.02 Describe subsystems of transportation vehicles, such as structural, propulsion, suspension, guidance, control, and support that must function together for a system to work effectively.
	18.03 Summarize processes, such as receiving, holding, storing, loading, moving, unloading, delivering, evaluating, marketing, managing, communicating, and using conventions are necessary for the entire transportation system to operate efficiently.
	18.04 Describe how governmental regulations often influence the design and operation of transportation systems.
19.0	Demonstrate an understanding of and be able to select and use manufacturing technologies. – The student will be able to:
	19.01 Describe manufacturing systems using mechanical processes that change the form of materials through processes of separating, forming, combining, and conditioning them.
	19.02 Classify manufactured goods as durable and non-durable.
	19.03 Employ the manufacturing process including the designing, development, making, and servicing of products and systems.
	19.04 Describe manufacturing technologies that are used to modify or alter manufactured products.
	19.05 Explain that materials must first be located before they can be extracted from the earth through processes such as harvesting, drilling, and mining.
20.0	Demonstrate an understanding of and be able to select and use construction technologies. – The student will be able to:
	20.01 Research building laws and codes.
	20.02 Identify factors such as style, convenience, cost, climate, and function in the selection of designs for structures.
	20.03 Explain that structures rest on a foundation.
	20.04 Classify structures as temporary or permanent.
	20.05 Describe subsystems of a building.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
	21.01 Follow classroom/laboratory safety rules and procedures.
	21.02 Demonstrate good housekeeping at workstations within a classroom/laboratory.
	21.03 Conduct classroom/laboratory activities and equipment operations in a safe manner.
	21.04 Exercise care and respect for all tools, equipment, and materials.
	21.05 Select appropriate tools, machines, and equipment to accomplish a given task.
	21.06 Identify color-coding safety standards.

CTE Standards and Benchmarks	
	21.07 Safely use hand tools and power equipment.
	21.08 Explain fire prevention and safety precautions and practices for extinguishing fires.
	21.09 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
22.0	Exhibit positive human relations and leadership skills. – The student will be able to:
	22.01 Perform roles in a student personnel system or in a career and technical student organization (CTSO).
	22.02 Work cooperatively with others.
23.0	Discuss individual interests, aptitudes, and opportunities as they relate to a career. – The student will be able to:
	23.01 Identify individual strengths and weaknesses.
	23.02 Discuss individual interests related to a career.
	23.03 Identify careers within specific areas of technology.
	23.04 Explore careers within specific areas of interest.
	23.05 Form an understanding and appreciation for work after listening to or observing technology workers.
	23.06 Form an understanding and appreciation for work after participating in a simulated technology group project in the laboratory.
	23.07 Form an understanding and appreciation for the roles and work of technology workers.
Listed below are the eight career and education planning course standards: The student will be able to**:**	
24.0	Describe the influences that societal, economic, and technological changes have on employment trends and future training.
25.0	Develop skills to locate, evaluate, and interpret career information.
26.0	Identify and demonstrate processes for making short and long term goals.
27.0	Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship.
28.0	Understand the relationship between educational achievement and career choices/postsecondary options.
29.0	Identify a career cluster and related pathways through an interest assessment that match career and education goals.
30.0	Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
31.0	Demonstrate knowledge of technology and its application in career fields/clusters.

Florida Department of Education
Student Performance Standards

Course Title: **Exploration of Communications Technology and Career Planning**
Course Number: **8600032**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:

The purpose of this course is to give students an opportunity to explore the area of communications technology and its associated careers. Students will be given the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of communications technology on our everyday lives. A list of minimum tools and equipment to implement this course is located at the end of this framework.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.04	(Explain, Demonstrate) how corporations can often create demand for a product by bringing it onto the market and advertising it.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Identify technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
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	Apply a product, system, or environment developed for one setting in another setting.
03.02	Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
04.01	Describe the ways that the use of communication technologies affects humans, including their safety, comfort, choices, and attitudes.
04.02	Explain that communication technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.

CTE Standards and Benchmarks	
	04.03 Describe ethical issues associated with the development and use of communication technology.
	04.04 Describe the economic, political, and cultural issues that are influenced by the development and use of communication technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
	05.01 Describe the management of waste produced by communication technological systems as an important societal issue.
	05.02 Identify how communication technologies can be affected by natural disaster.
	05.03 Make decisions about the development and use of communication technologies that put environmental and economic concerns in direct competition with one another.
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 Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
	06.02 Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
	06.03 Describe social and cultural priorities and values that are reflected in technological devices.
	06.04 Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
	07.01 Describe inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
	07.02 Explain how the specialization of function has been at the heart of many technological improvements.
	07.03 Explain that in the past, an invention or innovation was not usually developed with the knowledge of science.
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:
	08.01 Use design as a creative planning process that leads to useful products and systems.
	08.02 Explain why there is no perfect design.
	08.03 Evaluate criteria and constraints that are requirements for a design.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
	09.01 Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
	09.02 Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
	09.03 Model, test, evaluate and modify designs to transform ideas into practical solutions.
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 Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
	10.02 Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of

CTE Standards and Benchmarks	
	modifying an existing product or system to improve it.
	10.03 Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
	11.01 Apply a design process to solve problems in and beyond the laboratory-classroom.
	11.02 Specify criteria and constraints for the design.
	11.03 Make two-dimensional and three-dimensional representations of the designed solution.
	11.04 Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
	11.05 Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
	12.01 Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
	12.02 Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
	12.03 Use computers and calculators in various applications.
	12.04 Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
	13.01 Design and use instruments to gather data.
	13.02 Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.
	13.03 Identify trends and monitor potential consequences of technological development.
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
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 Create information and communication that allow information to be transferred from human to human, human to machine, machine to machine, and machine to human.
	17.02 Consider factors that influence the design of a message, such as the intended audience, medium, purpose, and nature of the message.
	17.03 Use symbols, measurements, and drawings to promote clear communication by providing a common language to express ideas.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
	21.01 Follow classroom/laboratory safety rules and procedures.
	21.02 Demonstrate good housekeeping at workstations within a classroom/laboratory.
	21.03 Conduct classroom/laboratory activities and equipment operations in a safe manner.

CTE Standards and Benchmarks	
	21.04 Exercise care and respect for all tools, equipment, and materials.
	21.05 Select appropriate tools, machines, and equipment to accomplish a given task.
	21.06 Identify color-coding safety standards.
	21.07 Safely use hand tools and power equipment.
	21.08 Explain fire prevention and safety precautions and practices for extinguishing fires.
	21.09 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
22.0	Exhibit positive human relations and leadership skills. – The student will be able to:
	22.01 Perform roles in a student personnel system or in a career and technical student organization (CTSO).
	22.02 Work cooperatively with others.
23.0	Discuss individual interests and aptitudes as they relate to a career. – The student will be able to:
	23.01 Identify individual strengths and weaknesses.
	23.02 Discuss individual interests related to a career.
	23.03 List occupations, job requirements, and job opportunities in communication technology.
	23.04 List academic and career programs at the secondary levels in communication technology.
Listed below are the eight career and education planning course standards: The student will be able to**:**	
24.0	Describe the influences that societal, economic, and technological changes have on employment trends and future training.
25.0	Develop skills to locate, evaluate, and interpret career information.
26.0	Identify and demonstrate processes for making short and long term goals.
27.0	Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship.
28.0	Understand the relationship between educational achievement and career choices/postsecondary options.
29.0	Identify a career cluster and related pathways through an interest assessment that match career and education goals.
30.0	Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
31.0	Demonstrate knowledge of technology and its application in career fields/clusters.
32.0	Demonstrate an application of basic digital publishing techniques. – The student will be able to:

CTE Standards and Benchmarks	
	32.01 Utilize digital publishing to combine input, editing, and output into a finished product.
	32.02 Utilize the components of layouts including type, typography and illustration to digitally manipulate the elements of a published product.
	32.03 Develop a web page using appropriate digital software.
	32.04 Create a document on a digital publishing system by inputting existing digitized graphics or by digitizing original art or photographs on a digitizing scanner.
33.0	Identify and describe the major types of printing techniques used in print production. – The student will be able to:
	33.01 Identify and explain standard printing processes including but not limited to: relief, gravure, screen process, and lithographic printing.
	33.02 Utilize common design principles to create camera ready art.
	33.03 Produce a printed product using a current printing method.
	33.04 Utilize appropriate finishing techniques on a printed project.
34.0	Identify and demonstrate the role of electronic communication. – The student will be able to:
	34.01 Explain how to create code, transmit, and receive messages using electronic devices.
	34.02 List and explain the common communication categories.
	34.03 Define and explain the use of telecommunications in everyday life.
	34.04 Utilize a telecommunications device to transmit and receive an electronic message.
	34.05 Produce an audio and/or visual product using electronic communication technology.
35.0	Identify and demonstrate the role of optical technology. – The student will be able to:
	35.01 Identify the purposes and property of light as used in communication technology.
	35.02 Explain how light signals are transmitted and received via different optical devices to include but not limited to: fiber optics, satellite communication, bandwidth, laser, and photography.
	35.03 Generate a product using optical technology.

***** Minimum Equipment and Tool needs for an Exploration of Communications Technology and Career Planning course *****

1. No more than a 2 students/computer ratio complete with built in DVD drive; appropriate furniture; lockdowns, and chairs
2. Class set plus 5 of textbooks
3. Software (all to include site licenses): publishing; design; word processing; office management; Photoshop or equal; illustrator or equal; 3D animation
4. One working color inkjet/laser printer
5. Internet access to the entire lab

6. One teacher computer station with an ergonomic chair (height adjustable, cushioned, on wheels)
7. One scanner
8. Three digital cameras

Florida Department of Education
Student Performance Standards

Course Title: **Exploration of Production Technology and Career Planning**
Course Number: **8600042**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:

The purpose of this course is to give students an opportunity to explore the area of production technology and its associated careers. Students will be given the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of production technology on our everyday lives.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.04	Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Describe technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control system using feedback.
02.04	Explain how technological systems can be connected to one another.
02.05	Repair malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Compare and contrast requirements or parameters placed on the development of a product or system.
02.07	Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors.
02.08	Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.
02.09	Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change.

CTE Standards and Benchmarks	
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	Modify the way technological systems interact with one another.
03.02	Apply a product, system, or environment developed for one setting in another setting.
03.03	Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
04.01	Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use.
04.02	Explain that technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.
04.03	Identify ethical issues associated with the development and use of technology.
04.04	Identify the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
05.01	Describe the management of waste produced by technological systems as an important societal issue.
05.02	Describe how technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
05.03	Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another.
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	Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
06.02	Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
06.03	Understand social and cultural priorities and values that are reflected in technological devices.
06.04	Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
07.01	Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
07.02	Explain how the specialization of function has been at the heart of many technological improvements.
07.03	Identify the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
07.04	Explain that in the past, an invention or innovation was not usually developed with the knowledge of science.
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:

CTE Standards and Benchmarks	
	08.01 Use design as a creative planning process that leads to useful products and systems.
	08.02 Explain why there is no perfect design.
	08.03 Evaluate criteria and constraints that are requirements for a design.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
	09.01 Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
	09.02 Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
	09.03 Model, test, evaluate and modify designs to transform ideas into practical solutions.
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 Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
	10.02 Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
	10.03 Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
	11.01 Apply a design process to solve problems in and beyond the laboratory-classroom.
	11.02 Specify criteria and constraints for the design.
	11.03 Make two-dimensional and three-dimensional representations of the designed solution.
	11.04 Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
	11.05 Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
	12.01 Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
	12.02 Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
	12.03 Use computers and calculators in various applications.
	12.04 Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
	13.01 Design and use instruments to gather data.
	13.02 Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.
	13.03 Identify trends and monitor potential consequences of technological development.

CTE Standards and Benchmarks	
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
19.0	Demonstrate an understanding of and be able to select and use manufacturing technologies. – The student will be able to:
	19.01 Describe manufacturing systems using mechanical processes that change the form of materials through processes of separating, forming, combining, and conditioning them.
	19.02 Classify manufactured goods as durable and non-durable.
	19.03 Employ the manufacturing process including the designing, development, making, and servicing of products and systems.
	19.04 Describe manufacturing technologies that are used to modify or alter manufactured products.
	19.05 Explain that materials must first be located before they can be extracted from the earth through processes such as harvesting, drilling, and mining.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
	21.01 Follow classroom/laboratory safety rules and procedures.
	21.02 Demonstrate good housekeeping at workstations within a classroom/laboratory.
	21.03 Conduct classroom/laboratory activities and equipment operations in a safe manner.
	21.04 Exercise care and respect for all tools, equipment, and materials.
	21.05 Select appropriate tools, machines, and equipment to accomplish a given task.
	21.06 Identify color-coding safety standards.
	21.07 Safely use hand tools and power equipment.
	21.08 Explain fire prevention and safety precautions and practices for extinguishing fires.
	21.09 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
22.0	Exhibit positive human relations and leadership skills. – The student will be able to:
	22.01 Perform roles in a student personnel system or in a career and technical student organization (CTSO).
	22.02 Work cooperatively with others.
23.0	Discuss individual interests, aptitudes, and opportunities as they relate to a career. – The student will be able to:
	23.01 Identify individual strengths and weaknesses.
	23.02 Discuss individual interests related to a career.
	23.03 List occupations, job requirements, and job opportunities in production technology.
	23.04 List occupational training programs and academic programs at the secondary/postsecondary levels in production technology.

CTE Standards and Benchmarks	
Listed below are the eight career and education planning course standards: The student will be able to**:**	
24.0	Describe the influences that societal, economic, and technological changes have on employment trends and future training.
25.0	Develop skills to locate, evaluate, and interpret career information.
26.0	Identify and demonstrate processes for making short and long term goals.
27.0	Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship.
28.0	Understand the relationship between educational achievement and career choices/postsecondary options.
29.0	Identify a career cluster and related pathways through an interest assessment that match career and education goals.
30.0	Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
31.0	Demonstrate knowledge of technology and its application in career fields/clusters.
36.0	Identify evolving technologies of production systems. – The student will be able to:
36.01	List evolving technologies of manufacturing and construction industries.
36.02	Discuss the evolution of technologies related to manufacturing systems and construction processes.
36.03	Brainstorm futuristic production systems.
37.0	Perform special skills unique to manufacturing technology. – The student will be able to:
37.01	Design a product for custom or mass production manufacturing.
37.02	Plan a mass production system for manufacturing a product.
37.03	Perform materials forming practices such as casting or molding, and compressing or stretching.
37.04	Perform materials separating practices such as shearing, chip removing, and other separating processes.
37.05	Perform materials conditioning practices such as heat treating, physical conditioning, or through chemical reactions.
37.06	Combine components through mixing, coating, bonding, and mechanical fastening.
37.07	Assemble a product or a subassembly of a product.
38.0	Express knowledge of factors that impact manufacturing technology and practices. – The student will be able to:
38.01	Explain economic factors that impact on manufacturing technology.
38.02	Research and identify consumer demands for a manufactured product.

CTE Standards and Benchmarks	
38.03	Identify sources of raw materials and/or standard stock materials needed for a manufactured product.
38.04	Interview, hire, train, or promote an applicant or employee for a simulated mass production manufacturing activity.
38.05	Define the terms "organized labor" and "collective bargaining."
38.06	Prepare a plan for marketing and distributing a manufactured product.

Florida Department of Education
Student Performance Standards

Course Title: **Exploration of Aerospace Technology and Career Planning**
Course Number: **8600052**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:

The purpose of this course is to give students an opportunity to explore the area of aerospace technology and its associated careers. Students will be given the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of aerospace technology on our everyday lives.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.02	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.03	Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
01.04	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Describe technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control systems using feedback.
02.04	Explain how technological systems can be connected to one another.
02.05	Repair malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Compare and contrast requirements or parameters placed on the development of a product or system.
02.07	Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors.
02.08	Describe different technologies that involve different sets of processes.
02.09	Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.

CTE Standards and Benchmarks	
	02.10 Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change.
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 Modify the way technological systems interact with one another.
	03.02 Apply a product, system, or environment developed for one setting in another setting.
	03.03 Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
	04.01 Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use.
	04.02 Explain that technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.
	04.03 Identify ethical issues associated with the development and use of technology.
	04.04 Identify the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
	05.01 Describe the management of waste produced by technological systems as an important societal issue.
	05.02 Describe how technologies can be used to repair damage and to break down waste from the use of various products and systems.
	05.03 Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another.
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 Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
	06.02 Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
	06.03 Understand social and cultural priorities and values that are reflected in technological devices.
	06.04 Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
	07.01 Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
	07.02 Explain how the specialization of function has been at the heart of many technological improvements.
	07.03 Identify the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
	07.04 Investigate how, that in the past, an invention or innovation was not usually developed with the knowledge of science.

CTE Standards and Benchmarks	
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:
08.01	Use design as a creative planning process that leads to useful products and systems.
08.02	Explain why there is no perfect design.
08.03	Evaluate criteria and constraints that are requirements for a design.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
09.01	Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
09.02	Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
09.03	Model, test, evaluate and modify designs to transform ideas into practical solutions.
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	Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
10.02	Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
10.03	Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
11.01	Apply a design process to solve problems in and beyond the laboratory-classroom.
11.02	Specify criteria and constraints for the design.
11.03	Make two-dimensional and three-dimensional representations of the designed solution.
11.04	Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
11.05	Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
12.01	Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
12.02	Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
12.03	Use computers and calculators in various applications.
12.04	Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
13.01	Design and use instruments to gather data.
13.02	Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.

CTE Standards and Benchmarks	
	13.03 Identify trends and monitor potential consequences of technological development.
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
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 Describe communication systems made up of a source, encoder, transmitter, receiver, decoder, and destination (e.g. phonetic alphabet).
	17.02 Use symbols, measurements, and drawings to promote clear communication by providing a common language to express ideas (e.g. airport symbols and signs).
40.0	Demonstrate an understanding of and be able to select and use aerospace technologies. – The student will be able to:
	40.01 Describe subsystems of aerospace vehicles, such as structural, propulsion, suspension, guidance, control, and support that must function together for a system to work effectively.
	40.02 Employ processes, such as receiving, holding, storing, loading, moving, unloading, delivering, evaluating, marketing, managing, communicating, and using conventions that are necessary for the entire transportation system to operate efficiently.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
	21.01 Follow classroom/laboratory safety rules and procedures.
	21.02 Demonstrate good housekeeping at workstations within a classroom/laboratory.
	21.03 Conduct classroom/laboratory activities and equipment operations in a safe manner.
	21.04 Exercise care and respect for all tools, equipment, and materials.
	21.05 Select appropriate tools, machines, and equipment to accomplish a given task.
	21.06 Identify color-coding safety standards.
	21.07 Safely use hand tools and power equipment.
	21.08 Explain fire prevention and safety precautions and practices for extinguishing fires.
	21.09 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
22.0	Exhibit positive human relations and leadership skills. – The student will be able to:
	22.01 Perform roles in a student personnel system or in a career and technical student organization (CTSO).
	22.02 Work cooperatively with others.
Listed below are the eight career and education planning course standards: The student will be able to**:**	
24.0	Describe the influences that societal, economic, and technological changes have on employment trends and future training.

CTE Standards and Benchmarks	
25.0	Develop skills to locate, evaluate, and interpret career information.
26.0	Identify and demonstrate processes for making short and long term goals.
27.0	Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship.
28.0	Understand the relationship between educational achievement and career choices/postsecondary options.
29.0	Identify a career cluster and related pathways through an interest assessment that match career and education goals.
30.0	Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
31.0	Demonstrate knowledge of technology and its application in career fields/clusters.
39.0	Discuss educational and training requirements as they relate to various aerospace careers. – The student will be able to:
	39.01 Research and identify various aerospace career choices.
	39.02 Discuss individual interests related to a career.
	39.03 List occupations, job requirements, and job opportunities in aerospace technology.
	39.04 List occupational training programs and academic programs at the secondary/postsecondary levels in aerospace technology.
41.0	Demonstrate knowledge of the basic principles of aerostatics and aerodynamics. – The student will be able to:
	41.01 Define terminology associated with aerostatics and aerodynamics.
	41.02 Explain how buoyancy principles affect an object in a fluid.
	41.03 Explain how Bernoulli's Principle applies to an object in flight.
	41.04 Identify and describe basic forces acting on an object in flight.
	41.05 Build an aerostatic vehicle.
	41.06 Build an aerodynamic vehicle.
42.0	Identify and demonstrate knowledge of both liquid and solid propellant rocket propulsion systems. – The student will be able to:
	42.01 Define technical terminology associated with propulsion systems.
	42.02 Identify parts of a solid-propellant rocket engine.
	42.03 Identify parts of a liquid-propellant rocket engine.
	42.04 Discuss the principles of rocket propulsion.
	42.05 Construct a solid- or liquid- propellant model rocket.
43.0	Define and describe the stages and forms of interference in basic satellite systems. – The student will be able to:
	43.01 Describe the basic functions and advantages of a communications satellite.

CTE Standards and Benchmarks	
	43.02 Describe the basic functions and advantages of a weather satellite.
	43.03 Describe the basic functions and advantages of a navigation satellite.
44.0	Become familiar with the basic information provided by a sectional chart. -- The student will be able to:
	44.01 Extract and utilize information from an aeronautical chart legend.
	44.02 Identify locations on an aeronautical chart using latitude and longitude
	44.03 Differentiate between statute and nautical miles.
	44.04 Determine a course and distance between two points on an aeronautical chart using a navigational plotter.
45.0	Describe and define different categories of aviation. – The student will be able to:
	45.01 Describe military aviation and be able to identify military aircraft types and missions.
	45.02 Define general aviation (including business and executive) and be able identify general aviation aircraft types.
	45.03 Define air carrier and be able identify air carrier aircraft types.

Florida Department of Education
Student Performance Standards

Course Title: **Exploration of Transportation Technology and Career Planning**
Course Number: **8600242**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:

The purpose of this course is to give students an opportunity to explore the area of transportation technology and its associated careers. Students will be given the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of transportation technology on our everyday lives.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.04	Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Describe technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control systems using feedback.
02.04	Explain how technological systems can be connected to one another.
02.05	Repair malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Compare and contrast requirements or parameters placed on the development of a product or system.
02.07	Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors.
02.08	Describe different technologies that involve different sets of processes.
02.09	Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.

CTE Standards and Benchmarks	
	02.10 Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change.
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 Modify the way technological systems interact with one another.
	03.02 Apply a product, system, or environment developed for one setting in another setting.
	03.03 Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
	04.01 Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use.
	04.02 Explain that technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.
	04.03 Identify ethical issues associated with the development and use of technology.
	04.04 Identify the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
	05.01 Describe the management of waste produced by technological systems as an important societal issue.
	05.02 Describe how technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
	05.03 Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another.
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 Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
	06.02 Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
	06.03 Understand social and cultural priorities and values that are reflected in technological devices.
	06.04 Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
	07.01 Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
	07.02 Explain how the specialization of function has been at the heart of many technological improvements.
	07.03 Identify the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
	07.04 Investigate how, that in the past, an invention or innovation was not usually developed with the knowledge of science.

CTE Standards and Benchmarks	
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:
08.01	Use design as a creative planning process that leads to useful products and systems.
08.02	Explain why there is no perfect design.
08.03	Evaluate criteria and constraints that are requirements for a design.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
09.01	Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
09.02	Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
09.03	Model, test, evaluate and modify designs to transform ideas into practical solutions.
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	Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
10.02	Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
10.03	Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
11.01	Apply a design process to solve problems in and beyond the laboratory-classroom.
11.02	Specify criteria and constraints for the design.
11.03	Make two-dimensional and three-dimensional representations of the designed solution.
11.04	Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
11.05	Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
12.01	Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
12.02	Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
12.03	Use computers and calculators in various applications.
12.04	Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
13.01	Design and use instruments to gather data.
13.02	Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.

CTE Standards and Benchmarks	
	13.03 Identify trends and monitor potential consequences of technological development.
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
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 Define energy as the capacity to do work.
	16.02 Explain how energy can be used to do work, using many processes.
	16.03 Define power as the rate at which energy is converted from one form to another or transferred from one place to another, or the rate at which work is done.
	16.04 Describe power systems used to drive and provide propulsion to other technological products and systems.
	16.05 Explain how much of the energy used in our environment is not used efficiently.
18.0	Demonstrate an understanding of and be able to select and use transportation technologies. – The student will be able to:
	18.01 Describe how transporting people and goods involve a combination of individuals and vehicles.
	18.02 Describe subsystems of transportation vehicles, such as structural, propulsion, suspension, guidance, control, and support that must function together for a system to work effectively.
	18.03 Identify governmental regulations that influence the design and operation of transportation systems.
	18.04 Employ processes, such as receiving, holding, storing, loading, moving, unloading, delivering, evaluating, marketing, managing, communicating, and using conventions that are necessary for the entire transportation system to operate efficiently.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
	21.01 Follow classroom/laboratory safety rules and procedures.
	21.02 Demonstrate good housekeeping at workstations within a classroom/laboratory.
	21.03 Conduct classroom/laboratory activities and equipment operations in a safe manner.
	21.04 Exercise care and respect for all tools, equipment, and materials.
	21.05 Select appropriate tools, machines, and equipment to accomplish a given task.
	21.06 Identify color-coding safety standards.
	21.07 Safely use hand tools and power equipment.
	21.08 Explain fire prevention and safety precautions and practices for extinguishing fires.
	21.09 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
22.0	Exhibit positive human relations and leadership skills. – The student will be able to:
	22.01 Perform roles in a student personnel system or in a career and technical student organization (CTSO).
	22.02 Work cooperatively with others.

CTE Standards and Benchmarks	
23.0	Discuss individual interests and aptitudes as they relate to a career. – The student will be able to:
23.01	Identify individual strengths and weaknesses.
23.02	Discuss individual interests related to a career.
23.03	List occupations, job requirements, and job opportunities in transportation technology.
23.04	List occupational training programs and academic programs at the secondary/postsecondary levels in transportation technology.
Listed below are the eight career and education planning course standards: The student will be able to**:**	
24.0	Describe the influences that societal, economic, and technological changes have on employment trends and future training.
25.0	Develop skills to locate, evaluate, and interpret career information.
26.0	Identify and demonstrate processes for making short and long term goals.
27.0	Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship.
28.0	Understand the relationship between educational achievement and career choices/postsecondary options.
29.0	Identify a career cluster and related pathways through an interest assessment that match career and education goals.
30.0	Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
31.0	Demonstrate knowledge of technology and its application in career fields/clusters.
46.0	Perform special skills unique to transportation technologies. – The student will be able to:
46.01	Disassemble and reassemble or perform maintenance on a muscle-powered bicycle.
46.02	Disassemble and reassemble or perform maintenance on a pneumatic or hydraulic device.
46.03	Disassemble and reassemble or perform maintenance on an internal combustion engine.
46.04	Disassemble and reassemble or perform maintenance on an electrical motor, generator, or alternator.
46.05	Construct, maintain, or repair a land, water, or air/space vehicle.
47.0	Express knowledge of the industries that deal with transportation technology. – The student will be able to:
47.01	Describe power and energy applications in transportation technology.
47.02	Identify transportation products that have been developed by industries.
47.03	List and describe transportation systems produced or used by industries.

Florida Department of Education
Student Performance Standards

Course Title: **Exploration of Power and Energy Technology and Career Planning**
Course Number: **8600252**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:

The purpose of this course is to give students an opportunity to explore the area of power and energy technology and its associated careers. Students will be given the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of power and energy technology on our everyday lives.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.04	Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Describe technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control systems using feedback.
02.04	Explain how technological systems can be connected to one another.
02.05	Repair malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Compare and contrast requirements or parameters placed on the development of a product or system.
02.07	Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors.
02.08	Describe different technologies that involve different sets of processes.
02.09	Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.

CTE Standards and Benchmarks	
	02.10 Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change.
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 Modify the way technological systems interact with one another.
	03.02 Apply a product, system, or environment developed for one setting in another setting.
	03.03 Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
	04.01 Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use.
	04.02 Explain that technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.
	04.03 Identify ethical issues associated with the development and use of technology.
	04.04 Identify the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
	05.01 Describe the management of waste produced by technological systems as an important societal issue.
	05.02 Describe how technologies can be used to repair damage and to break down waste from the use of various products and systems.
	05.03 Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another.
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 Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
	06.02 Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
	06.03 Understand social and cultural priorities and values that are reflected in technological devices.
	06.04 Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
	07.01 Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
	07.02 Explain how the specialization of function has been at the heart of many technological improvements.
	07.03 Identify the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
	07.04 Investigate how, that in the past, an invention or innovation was not usually developed with the knowledge of science.

CTE Standards and Benchmarks	
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:
08.01	Use design as a creative planning process that leads to useful products and systems.
08.02	Explain why there is no perfect design.
08.03	Evaluate criteria and constraints that are requirements for a design.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
09.01	Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
09.02	Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
09.03	Model, test, evaluate and modify designs to transform ideas into practical solutions.
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	Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
10.02	Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
10.03	Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
11.01	Apply a design process to solve problems in and beyond the laboratory-classroom.
11.02	Specify criteria and constraints for the design.
11.03	Make two-dimensional and three-dimensional representations of the designed solution.
11.04	Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
11.05	Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
12.01	Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
12.02	Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
12.03	Use computers and calculators in various applications.
12.04	Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
13.01	Design and use instruments to gather data.
13.02	Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.

CTE Standards and Benchmarks	
	13.03 Identify trends and monitor potential consequences of technological development.
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
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 Define energy as the capacity to do work.
	16.02 Explain how energy can be used to do work, using many processes.
	16.03 Define power as the rate at which energy is converted from one form to another or transferred from one place to another, or the rate at which work is done.
	16.04 Describe power systems used to drive and provide propulsion to other technological products and systems.
	16.05 Explain how much of the energy used in our environment is not used efficiently.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
	21.01 Follow classroom/laboratory safety rules and procedures.
	21.02 Demonstrate good housekeeping at workstations within a classroom/laboratory.
	21.03 Conduct classroom/laboratory activities and equipment operations in a safe manner.
	21.04 Exercise care and respect for all tools, equipment, and materials.
	21.05 Select appropriate tools, machines, and equipment to accomplish a given task.
	21.06 Identify color-coding safety standards.
	21.07 Safely use hand tools and power equipment.
	21.08 Explain fire prevention and safety precautions and practices for extinguishing fires.
	21.09 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
22.0	Exhibit positive human relations and leadership skills. – The student will be able to:
	22.01 Perform roles in a student personnel system or in a career and technical student organization (CTSO).
	22.02 Work cooperatively with others.
23.0	Discuss individual interests, aptitudes, and opportunities as they relate to a career. – The student will be able to:
	23.01 Identify individual strengths and weaknesses.
	23.02 Discuss individual interests related to a career.
	23.03 List occupations, job requirements, and employment opportunities in power energy technology.
	23.04 List occupational training programs and academic programs available at the secondary and postsecondary levels in power and energy technologies.

CTE Standards and Benchmarks	
Listed below are the eight career and education planning course standards: The student will be able to**:**	
24.0	Describe the influences that societal, economic, and technological changes have on employment trends and future training.
25.0	Develop skills to locate, evaluate, and interpret career information.
26.0	Identify and demonstrate processes for making short and long term goals.
27.0	Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship.
28.0	Understand the relationship between educational achievement and career choices/postsecondary options.
29.0	Identify a career cluster and related pathways through an interest assessment that match career and education goals.
30.0	Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
31.0	Demonstrate knowledge of technology and its application in career fields/clusters.
48.0	Perform special skills unique to power and energy technologies. – The student will be able to:
	48.01 Disassemble and reassemble or perform maintenance on a human-powered device.
	48.02 Disassemble and reassemble or perform maintenance on a pneumatic or hydraulic device.
	48.03 Disassemble and reassemble or perform maintenance on an internal combustion engine.
	48.04 Disassemble and reassemble or perform maintenance on an electrical motor, generator, or alternator.
	48.05 Construct a water-powered, wind-powered, steam-powered, thermal-powered, or solar-powered device.
49.0	Express knowledge of the industries that deal with power and energy technology. – The student will be able to:
	49.01 Identify the technologies that supply or control energy sources.
	49.02 Identify technologies that produce power systems.
	49.03 Describe power and energy applications in everyday life.
	49.04 List energy systems produced or used by industries.

Florida Department of Education
Student Performance Standards

Course Title: **Exploration of Engineering Technology and Career Planning**
Course Number: **8600062**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:

The purpose of this course is to give students an opportunity to explore the area of engineering technology and its associated careers. Students will be given the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of engineering technology on our everyday lives.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.04	Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Describe technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control systems using feedback.
02.04	Explain how technological systems can be connected to one another.
02.05	Repair malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Compare and contrast requirements or parameters placed on the development of a product or system.
02.07	Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors.
02.08	Describe different technologies that involve different sets of processes.
02.09	Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.

CTE Standards and Benchmarks	
	02.10 Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change.
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 Modify the way technological systems interact with one another.
	03.02 Apply a product, system, or environment developed for one setting in another setting.
	03.03 Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
	04.01 Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use.
	04.02 Explain that technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.
	04.03 Identify ethical issues associated with the development and use of technology.
	04.04 Identify the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
	05.01 Describe the management of waste produced by technological systems as an important societal issue.
	05.02 Describe how technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
	05.03 Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another.
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 Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
	06.02 Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
	06.03 Understand social and cultural priorities and values that are reflected in technological devices.
	06.04 Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
	07.01 Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
	07.02 Explain how the specialization of function has been at the heart of many technological improvements.
	07.03 Identify the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
	07.04 Investigate how, that in the past, an invention or innovation was not usually developed with the knowledge of science.

CTE Standards and Benchmarks	
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:
08.01	Use design as a creative planning process that leads to useful products and systems.
08.02	Explain why there is no perfect design.
08.03	Evaluate criteria and constraints that are requirements for a design.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
09.01	Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
09.02	Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
09.03	Model, test, evaluate and modify designs to transform ideas into practical solutions.
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	Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
10.02	Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
10.03	Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
11.01	Apply a design process to solve problems in and beyond the laboratory-classroom.
11.02	Specify criteria and constraints for the design.
11.03	Make two-dimensional and three-dimensional representations of the designed solution.
11.04	Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
11.05	Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
12.01	Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
12.02	Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
12.03	Use computers and calculators in various applications.
12.04	Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
13.01	Design and use instruments to gather data.
13.02	Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.

CTE Standards and Benchmarks	
	13.03 Identify trends and monitor potential consequences of technological development.
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
	21.01 Follow classroom/laboratory safety rules and procedures.
	21.02 Demonstrate good housekeeping at workstations within a classroom/laboratory.
	21.03 Conduct classroom/laboratory activities and equipment operations in a safe manner.
	21.04 Exercise care and respect for all tools, equipment, and materials.
	21.05 Select appropriate tools, machines, and equipment to accomplish a given task.
	21.06 Identify color-coding safety standards.
	21.07 Safely use hand tools and power equipment.
	21.08 Explain fire prevention and safety precautions and practices for extinguishing fires.
	21.09 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
22.0	Exhibit positive human relations and leadership skills. – The student will be able to:
	22.01 Perform roles in a student personnel system or in a career and technical student organization (CTSO).
	22.02 Work cooperatively with others.
23.0	Discuss individual interests, aptitudes, and opportunities as they relate to a career. – The student will be able to:
	23.01 Identify individual strengths and weaknesses.
	23.02 Discuss individual interests related to a career.
	23.03 List occupations, job requirements, and job opportunities in engineering technology
	23.04 List academic and career programs at the secondary levels in engineering technology.
Listed below are the eight career and education planning course standards: The student will be able to**:**	
24.0	Describe the influences that societal, economic, and technological changes have on employment trends and future training.
25.0	Develop skills to locate, evaluate, and interpret career information.
26.0	Identify and demonstrate processes for making short and long term goals.
27.0	Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of

CTE Standards and Benchmarks	
	entrepreneurship.
28.0	Understand the relationship between educational achievement and career choices/postsecondary options.
29.0	Identify a career cluster and related pathways through an interest assessment that match career and education goals.
30.0	Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
31.0	Demonstrate knowledge of technology and its application in career fields/clusters.
50.0	Demonstrate skill in technical sketching and drawing as it relates to engineering design. – The student will be able to:
	50.01 Explain the concepts of technical sketching and drawing.
	50.02 Create an orthographic sketch or drawing with appropriate layout and dimensions.
	50.03 Create an isometric sketch or drawing.
51.0	Demonstrate foundational knowledge and skills associated with the design of engineering systems (e.g. mechanical, fluid, electrical systems). – The student will be able to:
	51.01 Measure and calculate dimensions of parts using metric and customary systems.
	51.02 Identify simple machines.
	51.03 Explain mechanical advantage.
	51.04 Define scientific quantities that are used in engineering designs (e.g. mass, weight, force, voltage, current, resistance).
	51.05 Read and use system schematics (e.g. electrical and hydraulic circuits).
	51.06 Assemble, operate, and identify the parts of mechanical and electrical systems.
52.0	Demonstrate understanding and use of measurement tools and systems. – The student will be able to:
	52.01 Take and record both U.S customary and SI systems of measurement.
	52.02 Convert measurements using both U.S customary and SI systems of measurement.
53.0	Demonstrate an understanding of the engineering process. – The student will be able to:
	53.01 Define terminology associated with engineering products and systems.
	53.02 Describe the experimental method as it is applied to design.
	53.03 Create a model of a design solution to an engineering problem.
	53.04 Sketch a graphical or visual solution to an engineering problem.
	53.05 Present a report on an engineering design problem, concept or issue.
54.0	Demonstrate foundational knowledge and skills associated with common computer peripherals and computer functions. – The student will be able to:

CTE Standards and Benchmarks	
	54.01 Identify and describe the various internal and external components of a computer and their functions (e.g., power supply, hard drive, RAM, mother board, I/O cards/ports, cabling, etc.).
	54.02 Identify and describe various computer input devices (e.g., USB, firewall, parallel and serial, Ethernet, printers, camera).
55.0	Demonstrate an understanding of Internet safety and ethics. – The student will be able to:
	55.01 Differentiate between viruses and malware, the impact on personal privacy and computer operation, and ways to avoid infection.
	55.02 Adhere to cyber safety practices with regard to conducting Internet searches, email, chat rooms, and other social network websites.
	55.03 Adhere to Acceptable Use Policies when accessing the Internet.
56.0	Develop fundamental business productivity software skills. The students will be able to:
	56.01 Use appropriate functions in a word processing program. (e.g. format text, insert tables, create bulleted lists)
	56.02 Describe a spreadsheet and the ways in which it may be used.
	56.03 Describe presentation software, the ways it may be used, and appropriate presentation delivery skills.
	56.04 Use appropriate functions in a presentation software program. (e.g. insert images, duplicate slides, format text)
57.0	Successfully work as a member of a team. – The student will be able to:
	57.01 Accept responsibility for specific tasks in a given situation.
	57.02 Maintain a positive relationship with other team members.
	57.03 Document progress, and provide feedback on work accomplished in a timely manner.
	57.04 Complete assigned tasks in a timely and professional manner.

Florida Department of Education
Student Performance Standards

Course Title: **Exploration of Robotics Technology and Career Planning**
Course Number: **8600072**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:

The purpose of this course is to give students an opportunity to explore the area of robotics technology and its associated careers. Students will be given the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of robotics technology on our everyday lives.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.04	Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Describe technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control systems using feedback.
02.04	Explain how technological systems can be connected to one another.
02.05	Repair malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Compare and contrast requirements or parameters placed on the development of a product or system.
02.07	Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors.
02.08	Describe different technologies that involve different sets of processes.
02.09	Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.

CTE Standards and Benchmarks	
	02.10 Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change.
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 Modify the way technological systems interact with one another.
	03.02 Apply a product, system, or environment developed for one setting in another setting.
	03.03 Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
	04.01 Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use.
	04.02 Explain that technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.
	04.03 Identify ethical issues associated with the development and use of technology.
	04.04 Identify the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
	05.01 Describe the management of waste produced by technological systems as an important societal issue.
	05.02 Describe how technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
	05.03 Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another.
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 Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
	06.02 Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
	06.03 Understand social and cultural priorities and values that are reflected in technological devices.
	06.04 Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
	07.01 Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
	07.02 Explain how the specialization of function has been at the heart of many technological improvements.
	07.03 Identify the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
	07.04 Investigate how, that in the past, an invention or innovation was not usually developed with the knowledge of science.

CTE Standards and Benchmarks	
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:
08.01	Use design as a creative planning process that leads to useful products and systems.
08.02	Explain why there is no perfect design.
08.03	Evaluate criteria and constraints that are requirements for a design.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
09.01	Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
09.02	Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
09.03	Model, test, evaluate and modify designs to transform ideas into practical solutions.
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	Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
10.02	Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
10.03	Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
11.01	Apply a design process to solve problems in and beyond the laboratory-classroom.
11.02	Specify criteria and constraints for the design.
11.03	Make two-dimensional and three-dimensional representations of the designed solution.
11.04	Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
11.05	Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
12.01	Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
12.02	Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
12.03	Use computers and calculators in various applications.
12.04	Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
13.01	Design and use instruments to gather data.
13.02	Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.

CTE Standards and Benchmarks	
	13.03 Identify trends and monitor potential consequences of technological development.
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
	21.01 Follow classroom/laboratory safety rules and procedures.
	21.02 Demonstrate good housekeeping at workstations within a classroom/laboratory.
	21.03 Conduct classroom/laboratory activities and equipment operations in a safe manner.
	21.04 Exercise care and respect for all tools, equipment, and materials.
	21.05 Select appropriate tools, machines, and equipment to accomplish a given task.
	21.06 Identify color-coding safety standards.
	21.07 Safely use hand tools and power equipment.
	21.08 Explain fire prevention and safety precautions and practices for extinguishing fires.
	21.09 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
22.0	Exhibit positive human relations and leadership skills. – The student will be able to:
	22.01 Perform roles in a student personnel system or in a career and technical student organization (CTSO).
	22.02 Work cooperatively with others.
23.0	Discuss individual interests, aptitudes, and opportunities as they relate to a career. – The student will be able to:
	23.01 Identify individual strengths and weaknesses.
	23.02 Discuss individual interests related to a career.
	23.03 List occupations, job requirements, and job opportunities in robotics technology
	23.04 List academic and career programs at the secondary levels in robotics technology.
Listed below are the eight career and education planning course standards: The student will be able to**:**	
24.0	Describe the influences that societal, economic, and technological changes have on employment trends and future training.
25.0	Develop skills to locate, evaluate, and interpret career information.
26.0	Identify and demonstrate processes for making short and long term goals.
27.0	Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of

CTE Standards and Benchmarks	
	entrepreneurship.
28.0	Understand the relationship between educational achievement and career choices/postsecondary options.
29.0	Identify a career cluster and related pathways through an interest assessment that match career and education goals.
30.0	Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
31.0	Demonstrate knowledge of technology and its application in career fields/clusters.
58.0	Demonstrate an understanding of robotics, its history, applications, and evolution. – The student will be able to:
	58.01 Explore robotics history through research of the industry.
	58.02 Describe various applications of automation and robotics.
	58.03 Describe emerging technologies and their implications on the field of robotics.
59.0	Demonstrate an understanding of basic programming concepts. – The student will be able to:
	59.01 Apply the engineering design process to the creation of a program
	59.02 Discuss the use of algorithms
	59.03 Demonstrate the use of flowcharting in documenting an algorithm
	59.04 Demonstrate the use of pseudocode in documenting an algorithm
	59.05 Explain the function of conditional execution (eg if, if/else) and their uses
	59.06 Explain iterative programming structures (e.g., while, do/while) and their uses.
	59.07 Demonstrate the use of testing & debugging in the problem solving process
	59.08 Create functional program that satisfies prescribed criteria
60.0	Identify the basic subsystems on a robotic system. – The student will be able to:
	60.01 Define drivetrain, manipulator, and chassis
	60.02 Understand the difference between Ackermann and skid steering
	60.03 Identify the difference between Motors and servos
	60.04 Calculate simple gear ratios and their relationship with torque vs speed
	60.05 Assess the advantages and disadvantages of wheels vs tank treads
	60.06 Analyze the characteristics of a sound chassis design
61.0	Describe the role of sensors in the field of robotics. – The student will be able to:
	61.01 Define sensor.

CTE Standards and Benchmarks	
	61.02 Describe the basic operation common to all sensors.
	61.03 Describe the types of sensors and ways in which they can be categorized.
	61.04 Investigate the types of manipulators used in a robotic system.
62.0	Build, program, and configure a robot to perform predefined tasks. – The student will be able to:
	62.01 Design a robot.
	62.02 Create programs as required using robotic software that will allow the robot to perform a set of tasks.
	62.03 Create a flow chart that visually describes a basic robotic task.
	62.04 Configure subsystems to operate the robot.
	62.05 Create a portfolio including drawings and specifications, describing the robot, the tasks and rationale, and the results.
63.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:
	63.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.
	63.02 Employ critical thinking and interpersonal skills to resolve conflicts.
	63.03 Identify and document workplace performance goals and monitor progress toward those goals.
	63.04 Conduct technical research to gather information necessary for decision-making.

Florida Department of Education
Student Performance Standards

Course Title: **Exploration of Technical Design Technology and Career Planning**
Course Number: **8600082**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:

The purpose of this course is to give students an opportunity to explore the area of technical design technology and its associated careers. Students will be given the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of technical design technology on our everyday lives.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.04	Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Describe technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control systems using feedback.
02.04	Explain how technological systems can be connected to one another.
02.05	Repair malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Compare and contrast requirements or parameters placed on the development of a product or system.
02.07	Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors.
02.08	Describe different technologies that involve different sets of processes.
02.09	Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.

CTE Standards and Benchmarks	
	02.10 Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change.
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 Modify the way technological systems interact with one another.
	03.02 Apply a product, system, or environment developed for one setting in another setting.
	03.03 Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
	04.01 Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use.
	04.02 Explain that technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.
	04.03 Identify ethical issues associated with the development and use of technology.
	04.04 Identify the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
	05.01 Describe the management of waste produced by technological systems as an important societal issue.
	05.02 Describe how technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
	05.03 Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another.
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 Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
	06.02 Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
	06.03 Understand social and cultural priorities and values that are reflected in technological devices.
	06.04 Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
	07.01 Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
	07.02 Explain how the specialization of function has been at the heart of many technological improvements.
	07.03 Identify the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
	07.04 Investigate how, that in the past, an invention or innovation was not usually developed with the knowledge of science.

CTE Standards and Benchmarks	
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:
08.01	Use design as a creative planning process that leads to useful products and systems.
08.02	Explain why there is no perfect design.
08.03	Evaluate criteria and constraints that are requirements for a design.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
09.01	Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
09.02	Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
09.03	Model, test, evaluate and modify designs to transform ideas into practical solutions.
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	Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
10.02	Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
10.03	Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
11.01	Apply a design process to solve problems in and beyond the laboratory-classroom.
11.02	Specify criteria and constraints for the design.
11.03	Make two-dimensional and three-dimensional representations of the designed solution.
11.04	Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
11.05	Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
12.01	Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
12.02	Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
12.03	Use computers and calculators in various applications.
12.04	Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
13.01	Design and use instruments to gather data.
13.02	Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.

CTE Standards and Benchmarks	
	13.03 Identify trends and monitor potential consequences of technological development.
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
	21.01 Follow classroom/laboratory safety rules and procedures.
	21.02 Demonstrate good housekeeping at workstations within a classroom/laboratory.
	21.03 Conduct classroom/laboratory activities and equipment operations in a safe manner.
	21.04 Exercise care and respect for all tools, equipment, and materials.
	21.05 Select appropriate tools, machines, and equipment to accomplish a given task.
	21.06 Identify color-coding safety standards.
	21.07 Safely use hand tools and power equipment.
	21.08 Explain fire prevention and safety precautions and practices for extinguishing fires.
	21.09 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
22.0	Exhibit positive human relations and leadership skills. – The student will be able to:
	22.01 Perform roles in a student personnel system or in a career and technical student organization (CTSO).
	22.02 Work cooperatively with others.
23.0	Discuss individual interests, aptitudes, and opportunities as they relate to a career. – The student will be able to:
	23.01 Identify individual strengths and weaknesses.
	23.02 Discuss individual interests related to a career.
	23.03 List occupations, job requirements, and job opportunities in technical design technology
	23.04 List academic and career programs at the secondary levels in technical design technology.
Listed below are the eight career and education planning course standards: The student will be able to**:**	
24.0	Describe the influences that societal, economic, and technological changes have on employment trends and future training.
25.0	Develop skills to locate, evaluate, and interpret career information.
26.0	Identify and demonstrate processes for making short and long term goals.
27.0	Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of

CTE Standards and Benchmarks	
	entrepreneurship.
28.0	Understand the relationship between educational achievement and career choices/postsecondary options.
29.0	Identify a career cluster and related pathways through an interest assessment that match career and education goals.
30.0	Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
31.0	Demonstrate knowledge of technology and its application in career fields/clusters.
64.0	Demonstrate technical skills and applications common to all types of drafting–The student will be able to:
	64.01 Apply lettering techniques.
	64.02 Make freehand sketches.
	64.03 Use drafting symbols and alphabet of lines in accordance with technical standards and practices.
	64.04 Apply measuring techniques using decimals and fractions.
	64.05 Apply industry standard dimensioning techniques.
	64.06 Apply geometric construction techniques.
	64.07 Interpret information from drawings, prints, and sketches.
	64.08 Apply coordinate systems.
65.0	Demonstrate technical knowledge and skills for making basic orthographic drawings–The student will be able to:
	65.01 Describe orthographic projection.
	65.02 Identify the six principal views of an object.
	65.03 Produce a three-view orthographic drawing using traditional drafting methods.
66.0	Demonstrate technical knowledge and skills for making pictorial drawings–The student will be able to:
	66.01 Explain methods of pictorial drawing.
	66.02 Produce an isometric drawing using traditional drafting methods.
	66.03 Produce an oblique drawing using traditional drafting methods.
	66.04 Produce a perspective drawing using traditional drafting methods.
67.0	Demonstrate technical knowledge and skills for making a three-dimensional study model–The student will be able to:
	67.01 Produce a conceptual sketch.
	67.02 Produce a three-dimensioned model.

Florida Department of Education
Student Performance Standards

Course Title: **Exploration of Electronics Technology and Career Planning**
Course Number: **8600095**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:

The purpose of this course is to give students an opportunity to explore the area of electronics technology and its associated careers. Students will be given the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of electronics technology on our everyday lives.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.04	Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Describe technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control systems using feedback.
02.04	Explain how technological systems can be connected to one another.
02.05	Repair malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Compare and contrast requirements or parameters placed on the development of a product or system.
02.07	Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors.
02.08	Describe different technologies that involve different sets of processes.
02.09	Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.

CTE Standards and Benchmarks	
	02.10 Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change.
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 Modify the way technological systems interact with one another.
	03.02 Apply a product, system, or environment developed for one setting in another setting.
	03.03 Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
	04.01 Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use.
	04.02 Explain that technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.
	04.03 Identify ethical issues associated with the development and use of technology.
	04.04 Identify the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
	05.01 Describe the management of waste produced by technological systems as an important societal issue.
	05.02 Describe how technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
	05.03 Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another.
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 Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
	06.02 Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
	06.03 Understand social and cultural priorities and values that are reflected in technological devices.
	06.04 Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
	07.01 Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
	07.02 Explain how the specialization of function has been at the heart of many technological improvements.
	07.03 Identify the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
	07.04 Investigate how, that in the past, an invention or innovation was not usually developed with the knowledge of science.

CTE Standards and Benchmarks	
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:
08.01	Use design as a creative planning process that leads to useful products and systems.
08.02	Explain why there is no perfect design.
08.03	Evaluate criteria and constraints that are requirements for a design.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
09.01	Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
09.02	Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
09.03	Model, test, evaluate and modify designs to transform ideas into practical solutions.
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	Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
10.02	Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
10.03	Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
11.01	Apply a design process to solve problems in and beyond the laboratory-classroom.
11.02	Specify criteria and constraints for the design.
11.03	Make two-dimensional and three-dimensional representations of the designed solution.
11.04	Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
11.05	Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
12.01	Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
12.02	Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
12.03	Use computers and calculators in various applications.
12.04	Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
13.01	Design and use instruments to gather data.
13.02	Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.

CTE Standards and Benchmarks	
	13.03 Identify trends and monitor potential consequences of technological development.
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
	21.01 Follow laboratory safety rules and procedures.
	21.02 Demonstrate good housekeeping at workstations within a total laboratory.
	21.03 Conduct laboratory activities and equipment operations in a safe manner.
	21.04 Identify tools, machines, materials and equipment and describe their functions.
	21.05 Select appropriate tools, machines, and equipment to accomplish a given task.
	21.06 Demonstrate safe and correct use of tools, machines, and equipment.
	21.07 Identify color-coding safety standards.
	21.08 Explain fire prevention and safety precautions and practices for extinguishing fires.
	21.09 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
	21.10 Identify the factors that determine the severity of electrical shock.
	21.11 Identify lifesaving safety equipment such as ground fault circuit interrupters (GFCI), proper grounding.
	21.12 Identify protective equipment such as circuit breakers, fuses, surge protection, and uninterruptable power supplies.
	21.13 Compare the characteristics and applications of different types of batteries. (Lithium, NiCad, Alkaline, etc.)
	21.14 Explain ways in which batteries are rated and texted.
22.0	Exhibit positive human relations and leadership skills. – The student will be able to:
	22.01 Perform roles in a student personnel system or in a career and technical student organization (CTSO).
	22.02 Work cooperatively with others.
23.0	Discuss individual interests, aptitudes, and opportunities as they relate to a career. – The student will be able to:
	23.01 Identify individual strengths and weaknesses.
	23.02 Discuss individual interests related to a career.
	23.03 List occupations, job requirements, and job opportunities in electronics technology
	23.04 List academic and career programs at the secondary levels in electronics technology.

CTE Standards and Benchmarks	
Listed below are the eight career and education planning course standards: The student will be able to**:**	
24.0	Describe the influences that societal, economic, and technological changes have on employment trends and future training.
25.0	Develop skills to locate, evaluate, and interpret career information.
26.0	Identify and demonstrate processes for making short and long term goals.
27.0	Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship.
28.0	Understand the relationship between educational achievement and career choices/postsecondary options.
29.0	Identify a career cluster and related pathways through an interest assessment that match career and education goals.
30.0	Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
31.0	Demonstrate knowledge of technology and its application in career fields/clusters.
68.0	Demonstrate an understanding of the nature of electricity. – The student will be able to:
68.01	Identify parts of an atom.
68.02	Describe how the interaction of charged particles in the atom creates electron flow.
68.03	Evaluate whether a material is a conductor, insulator, or semiconductor based upon its number of valance electrons and its position on the periodic table.
68.04	Explain the difference between current, voltage and resistance.
68.05	Describe the properties of a magnet including polarity.
68.06	Identify the primary parts of a DC motor and demonstrate how it functions.
68.07	Identify the primary parts of a generator and demonstrate how it functions.
68.08	Compare and contrast the characteristics of a basic motor and generator.
68.09	Describe the composition of elements, mixtures, and compounds according to the electron theory.
68.10	Diagram and show the relationship between electrons, protons, and neutrons.
68.11	State the law of electrical charges.
68.12	Define electrical quantities (voltage, current, resistance, etc.).
68.13	Define units of measure including milli, micro, mega, and kilo.
69.0	Explore the basics of electric circuits. – The student will be able to:

CTE Standards and Benchmarks	
69.01	Identify the characteristics of series, parallel, and combination electrical circuits.
69.02	Sketch circuit diagrams using standardized schematic symbols.
69.03	Construct physical electrical circuits based upon circuit diagrams.
69.04	Measure voltage, current, and resistance using a multimeter.
69.05	Mathematically calculate voltage, current, and resistance using Ohm's law.
69.06	Integrate DC sources, lamps, switches, diodes, light emitting diodes, resistors, and capacitors into electrical circuits to achieve specific functions.
69.07	Determine the value of a fixed resistor based upon the color codes on those resistors.
70.0	Investigate digital signals and basic digital components. – The student will be able to:
70.01	Identify the relationship between the binary number system and the decimal number system and convert binary numbers to decimal.
70.02	Describe the functions of NOT, AND, OR, NAND, NOR, and XOR gates.
70.03	Create truth tables for logic scenarios and match those gates to truth tables.
70.04	Create a digital wave form and graph it for a binary sequence.
70.05	Determine the logic, sensors, gates, outputs, and other components needed to emulate existing electronic devices that utilize logic.
71.0	Demonstrate and apply proper use of electronic equipment. – The student will be able to:
71.01	Use a digital or analog volt-ohm meter (VOM) to obtain accurate measurements.
71.02	Apply safety rules in the use of electronic instruments and demonstrate proper care and maintenance for the equipment during storage and use.
71.03	Use voltmeters, ammeters, and ohmmeters to obtain accurate measurements.
71.04	Set up and use an oscilloscope to observe waveforms and to determine the voltage of the signal presented.
71.05	Use signal generators to produce waveforms of selected frequencies and shapes.
71.06	Use testers to determine the condition of electronic components.
72.0	Demonstrate proper electronic assembly methods. – The student will be able to:
72.01	Exhibit safe soldering techniques.
72.02	Identify proper soldering practices.
72.03	Demonstrate proper soldering applications.
72.04	Identify common electrical and electronics hand tools.
72.05	Demonstrate electronic component assembly.

CTE Standards and Benchmarks
72.06 Apply electrical tape to a spliced and soldered wire connection.
72.07 Solder and de-solder components and wires.
72.08 Describe the two methods of making a printed circuit board.

Florida Department of Education
Student Performance Standards

Course Title: **Exploration of Maritime Technology and Career Planning**
Course Number: **8600096**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:

The purpose of this course is to give students an opportunity to explore the area of maritime technology and its associated careers. Students will be given the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of maritime technology on our everyday lives.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.04	Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Describe technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control systems using feedback.
02.04	Explain how technological systems can be connected to one another.
02.05	Repair malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Compare and contrast requirements or parameters placed on the development of a product or system.
02.07	Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors.
02.08	Describe different technologies that involve different sets of processes.
02.09	Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.

CTE Standards and Benchmarks	
	02.10 Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change.
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 Modify the way technological systems interact with one another.
	03.02 Apply a product, system, or environment developed for one setting in another setting.
	03.03 Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
	04.01 Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use.
	04.02 Explain that technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.
	04.03 Identify ethical issues associated with the development and use of technology.
	04.04 Identify the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
	05.01 Describe the management of waste produced by technological systems as an important societal issue.
	05.02 Describe how technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
	05.03 Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another.
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 Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
	06.02 Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
	06.03 Understand social and cultural priorities and values that are reflected in technological devices.
	06.04 Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
	07.01 Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
	07.02 Explain how the specialization of function has been at the heart of many technological improvements.
	07.03 Identify the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
	07.04 Investigate how, that in the past, an invention or innovation was not usually developed with the knowledge of science.

CTE Standards and Benchmarks	
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:
08.01	Use design as a creative planning process that leads to useful products and systems.
08.02	Explain why there is no perfect design.
08.03	Evaluate criteria and constraints that are requirements for a design.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
09.01	Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
09.02	Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
09.03	Model, test, evaluate and modify designs to transform ideas into practical solutions.
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	Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
10.02	Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
10.03	Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
11.01	Apply a design process to solve problems in and beyond the laboratory-classroom.
11.02	Specify criteria and constraints for the design.
11.03	Make two-dimensional and three-dimensional representations of the designed solution.
11.04	Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
11.05	Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
12.01	Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
12.02	Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
12.03	Use computers and calculators in various applications.
12.04	Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
13.01	Design and use instruments to gather data.
13.02	Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.

CTE Standards and Benchmarks	
	13.03 Identify trends and monitor potential consequences of technological development.
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
	21.01 Follow classroom/laboratory safety rules and procedures.
	21.02 Demonstrate good housekeeping at workstations within a classroom/laboratory.
	21.03 Conduct classroom/laboratory activities and equipment operations in a safe manner.
	21.04 Exercise care and respect for all tools, equipment, and materials.
	21.05 Select appropriate tools, machines, and equipment to accomplish a given task.
	21.06 Identify color-coding safety standards.
	21.07 Safely use hand tools and power equipment.
	21.08 Explain fire prevention and safety precautions and practices for extinguishing fires.
	21.09 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
22.0	Exhibit positive human relations and leadership skills. – The student will be able to:
	22.01 Perform roles in a student personnel system or in a career and technical student organization (CTSO).
	22.02 Work cooperatively with others.
23.0	Discuss individual interests, aptitudes, and opportunities as they relate to a career. – The student will be able to:
	23.01 Identify individual strengths and weaknesses.
	23.02 Discuss individual interests related to a career.
	23.03 List occupations, job requirements, and job opportunities in maritime technology
	23.04 List academic and career programs at the secondary levels in maritime technology.
Listed below are the eight career and education planning course standards: The student will be able to**:**	
24.0	Describe the influences that societal, economic, and technological changes have on employment trends and future training.
25.0	Develop skills to locate, evaluate, and interpret career information.
26.0	Identify and demonstrate processes for making short and long term goals.
27.0	Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of

CTE Standards and Benchmarks	
	entrepreneurship.
28.0	Understand the relationship between educational achievement and career choices/postsecondary options.
29.0	Identify a career cluster and related pathways through an interest assessment that match career and education goals.
30.0	Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
31.0	Demonstrate knowledge of technology and its application in career fields/clusters.
73.0	Demonstrate knowledge relating to the historical origins of the maritime industry from vessel development, cultural, and trade perspectives. -- The student will be able to:
	73.01 Identify different types of ships and their origins.
	73.02 Create a timeline showing significant milestones in maritime history.
	73.03 Describe the significance of the Phoenicians, Vikings, and Asians on maritime cultures and traditions.
	73.04 Identify changes in sea going trade over the centuries.
	73.05 Describe the effect of trade on colonialism and the developing world.
74.0	Demonstrate proficiency in understanding the various career paths in the maritime industry. -- The student will be able to:
	74.01 Identify important factors to choosing a career.
	74.02 Explain the importance of planning for a career.
	74.03 Evaluate the impact of education on long term career success.
	74.04 Research and investigate career paths in the maritime industry.
	74.05 Describe the skills and personal qualities needed for maritime careers.
	74.06 Describe the everyday life of people working in maritime careers.
	74.07 Describe the future growth trends of maritime careers.
	74.08 Create a personal maritime career path based on interest.
75.0	Demonstrate an understanding of required skills sets by mariners including, safety training, regulations, and leadership. -- The student will be able to:
	75.01 Create a timeline explaining the evolution of the U.S. Coast Guard.
	75.02 Explain the main functions of the U.S. Coast Guard.
	75.03 Describe the U.S. Coast Guard and its place in the U.S. military.
	75.04 Describe the organization and leadership hierarchy on a vessel.
	75.05 Explain Master’s Level of Authority.

CTE Standards and Benchmarks	
	75.06 Describe the importance of leadership and chain-of-command on a vessel.
	75.07 Use seamanship skills to tie knots, identify equipment, and practice safe work methods.
	75.08 Describe the process of watch keeping, navigation, boat handling, anchoring, and mooring.
	75.09 Use seamanship terminology.
76.0	Demonstrate proficiency in using engineering methods for ship construction and design. -- The student will be able to:
	76.01 Identify and describe various types of marine engines.
	76.02 Explain the phenomenon of wind generation.
	76.03 Explain how wind has been used to propel ships.
	76.04 Describe the process and instrumentation for measuring and calculating wind power.
	76.05 Describe the principles of buoyancy.
	76.06 Explain the relationship between weight, volume, and density.
	76.07 Explain Archimedes Principal.
	76.08 Explain how a ship made of steel is able to float.
	76.09 Construct a model vessel from material with a density greater than 1 and ensure it floats.
	76.10 Use the engineering process to create solutions for a maritime related problem.
	76.11 Work in teams to using the engineering process to create solutions for a maritime problem.
77.0	Identify and explain various vessels and their and their use. -- The student will be able to:
	77.01 Identify various types of ships.
	77.02 Explain specific reasons for different types of ships.
	77.03 Describe different types of cargo vessels and cargo types.
	77.04 Describe different types of passenger vessels and their purpose
78.0	Evaluate the environmental impact of the maritime industry--The student will be able to:
	78.01 Explain the role of maritime in protection of the environment.
	78.02 Describe the environmental regulations on the maritime industry.
79.0	Examine the potential and use of marine resources. -- The student will be able to:
	79.01 Identify various energy sources related to the marine environment.
	79.02 Describe how solar energy can be used to provide power for ships.

CTE Standards and Benchmarks	
	79.03 Provide three examples of solar power use in the maritime industry.
	79.04 Explain how power could be generated from currents.
	79.05 Describe how energy can be created from tidal movements and what technology is used to perform this function.
80.0	Demonstrate an understanding of oceanography concepts--The student will be able to:
	80.01 Explain oceanography's role as a marine science disciple and its areas of investigation.
	80.02 Explain how ocean currents form and their role in distribution of heat.
	80.03 Describe the various types of tides and why they are monitored throughout the maritime industry.
	80.04 Evaluate the difference between tides, currents, and waves.
	80.05 Compare the El Nino and la Nina events and their impact on weather.
	80.06 Identify various ways wave energy is created and how it moves through the ocean.
	80.07 Apply mathematics to waves to solve for wave height and wave length.
	80.08 Explain the Coriolis Effect.
	80.09 Describe the theory of global warming and how humans have contributed to associated maritime events.
81.0	Demonstrate an understanding of the fundamentals of marine biology--The student will be able to:
	81.01 Describe how freshwater collects on the earth's surface and its relation to the oceans.
	81.02 Explain the ecological importance of mangroves in water filtration and runoff.
	81.03 Explain the role of mangroves in high energy events and environmental concerns for their removal.
	81.04 Identify and explain the importance of estuaries.

Florida Department of Education
Student Performance Standards

Course Title: **Exploration of Logistics and Supply Chain Technology and Career Planning**
Course Number: **8600097**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:

The purpose of this course is to give students an opportunity to explore the area of logistics and supply chain technology and its associated careers. Students will be given the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of logistics and supply chain technology on our everyday lives.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.04	Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Describe technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control systems using feedback.
02.04	Explain how technological systems can be connected to one another.
02.05	Repair malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Compare and contrast requirements or parameters placed on the development of a product or system.
02.07	Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors.
02.08	Describe different technologies that involve different sets of processes.
02.09	Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.

CTE Standards and Benchmarks	
	02.10 Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change.
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 Modify the way technological systems interact with one another.
	03.02 Apply a product, system, or environment developed for one setting in another setting.
	03.03 Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
	04.01 Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use.
	04.02 Explain that technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.
	04.03 Identify ethical issues associated with the development and use of technology.
	04.04 Identify the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
	05.01 Describe the management of waste produced by technological systems as an important societal issue.
	05.02 Describe how technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
	05.03 Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another.
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 Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
	06.02 Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
	06.03 Understand social and cultural priorities and values that are reflected in technological devices.
	06.04 Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
	07.01 Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
	07.02 Explain how the specialization of function has been at the heart of many technological improvements.
	07.03 Identify the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
	07.04 Investigate how, that in the past, an invention or innovation was not usually developed with the knowledge of science.

CTE Standards and Benchmarks	
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:
08.01	Use design as a creative planning process that leads to useful products and systems.
08.02	Explain why there is no perfect design.
08.03	Evaluate criteria and constraints that are requirements for a design.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
09.01	Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
09.02	Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
09.03	Model, test, evaluate and modify designs to transform ideas into practical solutions.
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	Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
10.02	Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
10.03	Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
11.01	Apply a design process to solve problems in and beyond the laboratory-classroom.
11.02	Specify criteria and constraints for the design.
11.03	Make two-dimensional and three-dimensional representations of the designed solution.
11.04	Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
11.05	Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
12.01	Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
12.02	Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
12.03	Use computers and calculators in various applications.
12.04	Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
13.01	Design and use instruments to gather data.
13.02	Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.

CTE Standards and Benchmarks	
	13.03 Identify trends and monitor potential consequences of technological development.
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
	21.01 Follow classroom/laboratory safety rules and procedures.
	21.02 Demonstrate good housekeeping at workstations within a classroom/laboratory.
	21.03 Conduct classroom/laboratory activities and equipment operations in a safe manner.
	21.04 Exercise care and respect for all tools, equipment, and materials.
	21.05 Select appropriate tools, machines, and equipment to accomplish a given task.
	21.06 Identify color-coding safety standards.
	21.07 Safely use hand tools and power equipment.
	21.08 Explain fire prevention and safety precautions and practices for extinguishing fires.
	21.09 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
22.0	Exhibit positive human relations and leadership skills. – The student will be able to:
	22.01 Perform roles in a student personnel system or in a career and technical student organization (CTSO).
	22.02 Work cooperatively with others.
23.0	Discuss individual interests, aptitudes, and opportunities as they relate to a career. – The student will be able to:
	23.01 Identify individual strengths and weaknesses.
	23.02 Discuss individual interests related to a career.
	23.03 List occupations, job requirements, and job opportunities in logistics and supply chain technology
	23.04 List academic and career programs at the secondary levels in logistics and supply chain technology.
Listed below are the eight career and education planning course standards: The student will be able to**:**	
24.0	Describe the influences that societal, economic, and technological changes have on employment trends and future training.
25.0	Develop skills to locate, evaluate, and interpret career information.
26.0	Identify and demonstrate processes for making short and long term goals.
27.0	Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of

CTE Standards and Benchmarks	
	entrepreneurship.
28.0	Understand the relationship between educational achievement and career choices/postsecondary options.
29.0	Identify a career cluster and related pathways through an interest assessment that match career and education goals.
30.0	Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
31.0	Demonstrate knowledge of technology and its application in career fields/clusters.
82.0	Demonstrate an understanding of global logistics and supply chain. -- The student will be able to:
	82.01 Discuss the history, career fields, and benefits of the global supply chain industry.
	82.02 Describe principal elements of the logistics environment and logistics systems.
	82.03 Explore career pathways within global logistics and supply chain.
	82.04 Explain ways in which handling of product throughout supply chain logistics affects company's viability and profitability.
	82.05 Define basic principles of just-in-time purchasing and inventory control.
	82.06 Identify major security requirements applicable to the logistics environment.
	82.07 Cite examples of environmental and financial impacts of logistics activities.
83.0	Demonstrate an understanding of transportation systems. -- The student will be able to:
	83.01 Identify various transportation modes.
	83.02 Describe and contrast the different modes of transportation and their advantages/disadvantages.
	83.03 List the main considerations in determining the best mode.
	83.04 Describe and assess global freight transportation systems.
84.0	Demonstrate professional communication skills. -- The student will be able to:
	84.01 Identify effective communications to both internal and external customers.
	84.02 Identify ways to elicit clear statements of customer requirements and specifications.
	84.03 Demonstrate an understanding of teamwork and good professional workplace behavior to solve problems.
	84.04 List characteristics of an effective team member.
	84.05 Explain ways to set team goals.
	84.06 Identify use of team environment to solve problems and resolve conflicts.
	84.07 Describe typical requirements for good workplace conduct.
85.0	Demonstrate customer service skills. -- The student will be able to:

CTE Standards and Benchmarks	
85.01	Exhibit acceptable workplace dress or attire.
85.02	Exhibit punctuality, initiative, courtesy, loyalty, and honesty.
85.03	Use a personality inventory for personal improvement.
85.04	Exhibit the ability to get along with others.
85.05	Discuss the importance of human relations.
85.06	Develop and demonstrate the unique human relations skills needed for successful entry and progress in the customer service occupations or marketing occupations selected as a career objective.
85.07	Differentiate between an acceptable and an unacceptable code of business ethical conduct.
86.0	Demonstrate an understanding of warehouse operations. -- The student will be able to:
86.01	Identify and discuss the characteristics, purpose and importance of warehouse operations and supply chain management.
86.02	Define material handling logistics as it applies to the warehousing function.
86.03	Define "logical" in terms of the term logistics.
86.04	Define movement in a warehouse and identify the various locations within the warehouse where planned efficient movement of materials takes place.
86.05	Explain channels of distribution.
86.06	Discuss safety regulatory requirements and procedures.
86.07	Identify various types of equipment available to enhance the efficient movement of materials within a warehouse.
86.08	Identify the various types of loading docks and cross docking.
86.09	Define the term "peaks and valleys" as it applies to warehouse activity.
86.10	Explain the importance of staging and JIT.
86.11	Identify the primary types of hand-operated pieces of warehouse equipment.
86.12	Explain the concept of "balancing" as it applies to counterbalanced lift trucks.
86.13	Identify warehouse documents (e.g., pick tickets, special orders, inventory forms).
87.0	Demonstrate an understanding of storage and control operations--The student will be able to:
87.01	Explain the concepts involved in determining the best method for storage and the equipment needed to facilitate a cost effective and efficient warehouse.
87.02	Identify the factors that are involved with the calculating and estimating of the storage area needed for retention of materials in a warehouse.
87.03	Define the following storage related terms: Size, Volume, Density, Pallet, and Case.
87.04	Define the terms packaging, SKU, stacking frame, term "Logistics Execution Systems" (LES), signage and signposting, "real time"

CTE Standards and Benchmarks	
	and barcoding.
87.05	Explain how the volume of materials, space usage, and control affect the design of storage space in a warehouse design.
87.06	Explain inventories and their importance.
87.07	Identify and analyze various warehouse storage systems.
87.08	Identify the basic configuration for pallet rack.
87.09	Identify the various types of technologies developed over the years to keep track of goods within the warehouse.
87.10	Define the components of an LES.
87.11	Define radio frequency identification (RFID).
87.12	Explain the importance of automation in warehousing.
87.13	Identify the value of emerging technologies related to warehouse operations.

Florida Department of Education
Student Performance Standards

Course Title: **Exploration of Green Construction and Architecture Technology and Career Planning**
Course Number: **8600098**
Course Length: **Semester**
Teacher Certification: **Refer to the Program Structure section**

Course Description:

The purpose of this course is to give students an opportunity to explore the area of green construction and architecture technology and its associated careers. Students will be given the opportunity to solve technological problems using a variety of tools, materials, processes and systems while gaining an understanding of the effects of green construction and architecture technology on our everyday lives.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
01.02	Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative.
01.03	Explain how technology is closely linked with creativity, which has resulted in innovation.
01.04	Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01	Describe technological systems including input, processes, output, and, at times, feedback.
02.02	Apply systems thinking, involving considering how every part relates to others.
02.03	Identify control systems having no feedback path and requiring human intervention, and control systems using feedback.
02.04	Explain how technological systems can be connected to one another.
02.05	Repair malfunctions of any part of a system that may affect the function and quality of the system.
02.06	Compare and contrast requirements or parameters placed on the development of a product or system.
02.07	Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors.
02.08	Describe different technologies that involve different sets of processes.
02.09	Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.

CTE Standards and Benchmarks	
	02.10 Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change.
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 Modify the way technological systems interact with one another.
	03.02 Apply a product, system, or environment developed for one setting in another setting.
	03.03 Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
	04.01 Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use.
	04.02 Explain that technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences.
	04.03 Identify ethical issues associated with the development and use of technology.
	04.04 Identify the economic, political, and cultural issues that are influenced by the development and use of technology.
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
	05.01 Describe the management of waste produced by technological systems as an important societal issue.
	05.02 Describe how technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
	05.03 Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another.
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 Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
	06.02 Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations.
	06.03 Understand social and cultural priorities and values that are reflected in technological devices.
	06.04 Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems.
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:
	07.01 Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
	07.02 Explain how the specialization of function has been at the heart of many technological improvements.
	07.03 Identify the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
	07.04 Investigate how, that in the past, an invention or innovation was not usually developed with the knowledge of science.

CTE Standards and Benchmarks	
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:
08.01	Use design as a creative planning process that leads to useful products and systems.
08.02	Explain why there is no perfect design.
08.03	Evaluate criteria and constraints that are requirements for a design.
09.0	Demonstrate an understanding of engineering design. – The student will be able to:
09.01	Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.
09.02	Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
09.03	Model, test, evaluate and modify designs to transform ideas into practical solutions.
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	Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system.
10.02	Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it.
10.03	Identify technological problems that are best solved through experimentation.
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:
11.01	Apply a design process to solve problems in and beyond the laboratory-classroom.
11.02	Specify criteria and constraints for the design.
11.03	Make two-dimensional and three-dimensional representations of the designed solution.
11.04	Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.
11.05	Make a product or system and document the solution.
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:
12.01	Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
12.02	Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
12.03	Use computers and calculators in various applications.
12.04	Operate and maintain systems in order to achieve a given purpose.
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
13.01	Design and use instruments to gather data.
13.02	Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.

CTE Standards and Benchmarks	
	13.03 Identify trends and monitor potential consequences of technological development.
	13.04 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
21.0	Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. – The student will be able to:
	21.01 Follow classroom/laboratory safety rules and procedures.
	21.02 Demonstrate good housekeeping at workstations within a classroom/laboratory.
	21.03 Conduct classroom/laboratory activities and equipment operations in a safe manner.
	21.04 Exercise care and respect for all tools, equipment, and materials.
	21.05 Select appropriate tools, machines, and equipment to accomplish a given task.
	21.06 Identify color-coding safety standards.
	21.07 Safely use hand tools and power equipment.
	21.08 Explain fire prevention and safety precautions and practices for extinguishing fires.
	21.09 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.
22.0	Exhibit positive human relations and leadership skills. – The student will be able to:
	22.01 Perform roles in a student personnel system or in a career and technical student organization (CTSO).
	22.02 Work cooperatively with others.
23.0	Discuss individual interests, aptitudes, and opportunities as they relate to a career. – The student will be able to:
	23.01 Identify individual strengths and weaknesses.
	23.02 Discuss individual interests related to a career.
	23.03 List occupations, job requirements, and job opportunities in green construction and architectural technology
	23.04 List academic and career programs at the secondary levels in green construction and architectural technology.
Listed below are the eight career and education planning course standards: The student will be able to**:**	
24.0	Describe the influences that societal, economic, and technological changes have on employment trends and future training.
25.0	Develop skills to locate, evaluate, and interpret career information.
26.0	Identify and demonstrate processes for making short and long term goals.
27.0	Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of

CTE Standards and Benchmarks	
	entrepreneurship.
28.0	Understand the relationship between educational achievement and career choices/postsecondary options.
29.0	Identify a career cluster and related pathways through an interest assessment that match career and education goals.
30.0	Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
31.0	Demonstrate knowledge of technology and its application in career fields/clusters.
88.0	Demonstrate an understanding of the built environment. -- The student will be able to:
	88.01 Research the development of construction technology, its impact on the built environment and the impact of growth on the construction industry.
	88.02 Examine and compare the relationship between the built environment and the natural environment.
	88.03 Compare architectural designs and/or models to understand how technical and functional components impact aesthetic qualities.
	88.04 Analyze changes in architectural styles and construction practices over time.
	88.05 Research innovative historical architectural and/or engineering works and examine the significance of their legacy for the future.
89.0	Demonstrate an understanding of the green environment. -- The student will be able to:
	89.01 Recognize and analyze the development of the built environment and its impacts on the natural environment such as pollution, deforestation, climate change, health and disease.
	89.02 Describe and give examples of how a green built environment creates growth for the construction industry, and the economy such as health and safety, transportation and natural resources.
	89.03 Examine and compare the relationship between a green built environment and the natural environment.
	89.04 Explain the purpose of the United States Green Building Council (USGBC), the Green Building Certification Institute (GBCI) and Leadership for Energy and Environmental Design (LEED) are and how they create growth for the construction industry and the economy.
	89.05 Research sustainable building design and its relationship between health, energy efficiency and money savings for government, businesses and individuals.
	89.06 Research the effects of building science on construction and energy efficiency.
	89.07 Research renewable fuels and energy.
90.0	Use building laws and codes, style, convenience, cost, climate, and function to select building designs. – The student will be able to:
	90.01 Identify the function and types of building foundations.
	90.02 Identify the subsystems contained in buildings.
	90.03 Summarize energy efficient building materials and processes.
91.0	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. -- The student will be

CTE Standards and Benchmarks		
	able to:	
	91.01	Apply a systematic process to determine to meet the criteria and constraints of the problem.
	91.02	Make two-dimensional and three-dimensional representations of the designed solution
	91.03	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
	91.04	Apply a design process to solve problems in or beyond the laboratory-classroom.
	91.05	Summarize energy efficient building materials and processes.
	91.06	Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved
92.0	Describe the human impact on the environment and identify ways to minimize environmental impacts. -- The student will be able to:	
	92.01	Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
	92.02	Construct an argument supported by evidence for how increases in human population and per capita consumption of natural resources impact Earth's systems.
	92.03	Analyze recycling opportunities for building construction and materials.
	92.04	Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.
93.0	Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions and accurately measure drawing dimensions. -- The student will be able to:	
	93.01	Construct geometric figures including but not limited to triangles, squares, rectangles, and circles.
	93.02	Solve real-world and mathematical problems involving area, volume, perimeter, and surface area of two- and three-dimensional objects composed of geometric figures including but not limited to triangles, quadrilaterals, polygons, cubes, and right prisms. Identify the subsystems contained in buildings.
	93.03	Solve real-world and mathematical problems involving area, volume, perimeter, and surface area of two- and three-dimensional objects composed of geometric figures including but not limited to triangles, quadrilaterals, polygons, cubes, and right prisms.
	93.04	Use a ruler and an architectural scale to measure and create drawings and produce scale drawings a building.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

MyCareerShines is an interactive resource to assist students in identifying their ideal career and to enhance preparation for employment. Teachers are encouraged to integrate this resource into the program curriculum to meet the employability goals for each student.

Career and Technical Student Organization (CTSO)

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Accommodations

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In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Florida Department of Education
Curriculum Framework

Course Title: **Orientation to Career Clusters**
Course Type: **Orientation/Exploratory**

Secondary – Middle School	
Course Number	8000400
CIP Number	1498999907
Grade Level	6 – 8
Standard Length	Semester
Teacher Certification	Refer to the **Course Structure** section.
CTSO	Any CTSO as appropriate

Purpose

The purpose of this course is to assist students in making informed decisions regarding their future academic and occupational goals and to provide information regarding careers in the seventeen career clusters. This course is a compilation of modules for each of the seventeen career clusters and is designed to provide flexibility in course offerings. Any number of modules can be selected to comprise a course that meets the needs of the students.

The content includes, but is not limited to, the orientation of students to career pathways in the career and technical education field. Reinforcement of academic skills occurs through classroom instruction and applied laboratory procedures. This course is recommended for students in the sixth grade, but not required.

Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Course Structure

The length of this course is one semester. It may be offered for two semesters when appropriate. When offered for one semester, it is recommended that it be at the exploratory level and more in-depth when offered for two semesters.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the course structure:

Course Number	Course Title	Teacher Certification	Length
8000400	Orientation to Career Clusters	ANY FIELD	Semester

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition.

Standards

After successfully completing this course, the student will be able to perform the following:

01.0 Identify Florida's seventeen career clusters.
02.0 Identify and explore careers in the Agriculture, Food & Natural Resources cluster.
03.0 Identify and explore careers in the Architecture & Construction cluster.
04.0 Identify and explore careers in the Arts, A/V Technology & Communication cluster.
05.0 Identify and explore careers in the Business Management & Administration cluster.
06.0 Identify and explore careers in the Education & Training cluster.
07.0 Identify and explore careers in the Energy cluster.
08.0 Identify and explore careers in the Finance cluster.
09.0 Identify and explore careers in the Government & Public Administration cluster.
10.0 Identify and explore careers in the Health Science cluster.
11.0 Identify and explore careers in the Hospitality and Tourism cluster.
12.0 Identify and explore careers in the Human Services cluster.
13.0 Identify and explore careers in the Information Technology cluster.
14.0 Identify and explore careers in the Law, Public Safety & Security cluster.
15.0 Identify and explore careers in the Manufacturing cluster.
16.0 Identify and explore careers in the Marketing, Sales & Service cluster.
17.0 Identify and explore careers in the Engineering and Technology Education cluster.
18.0 Identify and explore careers in the Transportation, Distribution & Logistics cluster.
19.0 Describe leadership skills.

Florida Department of Education
Student Performance Standards

Course Title: **Orientation to Career Clusters**
Course Number: **8000400**
Course Credit: **Semester**

Course Description:

This course is a broad overview of the seventeen career clusters offered in Florida. This course provides hands-on introductory activities for each career cluster as well as opportunities to acquire and demonstrate beginning leadership skills.

CTE Standards and Benchmarks	
01.0	Identify Florida's seventeen career clusters – the student will be able to:
01.01	List Florida's seventeen career clusters.
01.02	Research the national career clusters website.
01.03	Identify the Career and Technical Student Organizations (CTSO) appropriate for Career and Technical Education (CTE) programs.
01.04	Explain the purpose of a CTSO.
02.0	Identify and explore careers in the Agriculture, Food & Natural Resources cluster – the student will be able to:
02.01	Identify the pathways in the Agriculture, Food & Natural Resources career cluster and the careers in each pathway.
02.02	Describe the types of places that employ individuals who have careers in the Agriculture, Food & Natural Resources career cluster.
02.03	Describe the variety of tasks performed by individuals who have careers in the Agriculture, Food & Natural Resources career cluster.
02.04	List the skills, abilities, and talents needed for careers in the Agriculture, Food & Natural Resources career cluster.
02.05	Identify the level of training and education required for careers in the Agriculture, Food & Natural Resources career cluster.
02.06	Research a career in the Agriculture, Food & Natural Resources career cluster and present findings to the class.
02.07	Apply math, science, and reading skills in the completion of a project or activity related to the Agriculture, Food & Natural Resources career cluster.
03.0	Identify and explore careers in the Architecture & Construction cluster – the student will be able to:
03.01	Identify the pathways in the Architecture & Construction career cluster and the careers in each pathway.

CTE Standards and Benchmarks	
	03.02 Describe the types of places that employ individuals who have careers in the Architecture & Construction career cluster.
	03.03 Describe the variety of tasks performed by individuals who have careers in the Architecture & Construction career cluster.
	03.04 List the skills, abilities, and talents needed for careers in the Architecture & Construction career cluster.
	03.05 Identify the level of training and education required for careers in the Architecture & Construction career cluster.
	03.06 Research a career in the Architecture & Construction career cluster and present findings to the class.
	03.07 Apply math, science, and reading skills in the completion of a project or activity related to the Architecture & Construction career cluster.
04.0	Identify and explore careers in the Arts, A/V Technology & Communication cluster – the student will be able to:
	04.01 Identify the pathways in the Arts, A/V Technology & Communication career cluster and the careers in each pathway.
	04.02 Describe the types of places that employ individuals who have careers in the Arts, A/V Technology & Communication career cluster.
	04.03 Describe the variety of tasks performed by individuals who have careers in the Arts, A/V Technology & Communication career cluster.
	04.04 List the skills, abilities, and talents needed for careers in the Arts, A/V Technology & Communication career cluster.
	04.05 Identify the level of training and education required for careers in the Arts, A/V Technology & Communication career cluster.
	04.06 Research a career in the Arts, A/V Technology & Communication career cluster and present findings to the class.
	04.07 Apply math, science, and reading skills in the completion of a project or activity related to the Arts, A/V Technology & Communication career cluster.
05.0	Identify and explore careers in the Business, Management & Administration cluster – the student will be able to:
	05.01 Identify the pathways in the Business, Management & Administration career cluster and the careers in each pathway.
	05.02 Describe the types of places that employ individuals who have careers in the Business Management & Administration career cluster.
	05.03 Describe the variety of tasks performed by individuals who have careers in the Business Management & Administration career cluster.
	05.04 List the skills, abilities, and talents needed for careers in the Business Management & Administration career cluster.
	05.05 Identify the level of training and education required for careers in the Business Management & Administration career cluster.
	05.06 Research a career in the Business Management & Administration career cluster and present findings to the class.
	05.07 Apply math, science, and reading skills in the completion of a project or activity related to the Business Management & Administration career cluster.

CTE Standards and Benchmarks	
06.0	Identify and explore careers in the Education & Training cluster – the student will be able to:
06.01	Identify the pathways in the Education & Training career cluster and the careers in each pathway.
06.02	Describe the types of places that employ individuals who have careers in the Education & Training career cluster.
06.03	Describe the variety of tasks performed by individuals who have careers in the Education & Training career cluster.
06.04	List the skills, abilities, and talents needed for careers in the Education & Training career cluster.
06.05	Identify the level of training and education required for careers in the Education & Training career cluster.
06.06	Research a career in the Education & Training career cluster and present findings to the class.
06.07	Apply math, science, and reading skills in the completion of a project or activity related to the Education & Training career cluster.
07.0	Identify and explore careers in the Energy cluster – the student will be able to:
07.01	Identify the pathways in the Energy career cluster and the careers in each pathway.
07.02	Describe the types of places that employ individuals who have careers in the Energy career cluster.
07.03	Describe the variety of tasks performed by individuals who have careers in the Energy career cluster.
07.04	List the skills, abilities, and talents needed for careers in the Energy career cluster.
07.05	Identify the level of training and education required for careers in the Energy career cluster.
07.06	Research a career in the Energy career cluster and present findings to the class.
07.07	Apply math, science, and reading skills in the completion of a project or activity related to the Energy career cluster.
08.0	Identify and explore careers in the Finance cluster – the student will be able to:
08.01	Identify the pathways in the Finance career cluster and the careers in each pathway.
08.02	Describe the types of places that employ individuals who have careers in the Finance career cluster.
08.03	Describe the variety of tasks performed by individuals who have careers in the Finance career cluster.
08.04	List the skills, abilities, and talents needed for careers in the Finance career cluster.
08.05	Identify the level of training and education required for careers in the Finance career cluster.
08.06	Research a career in the Finance career cluster and present findings to the class.

CTE Standards and Benchmarks	
	08.07 Apply math, science, and reading skills in the completion of a project or activity related to the Finance career cluster.
09.0	Identify and explore careers in the Government & Public Administration cluster – the student will be able to:
	09.01 Identify the pathways in the Government & Public Administration career cluster and the careers in each pathway.
	09.02 Describe the types of places that employ individuals who have careers in the Government & Public Administration career cluster.
	09.03 Describe the variety of tasks performed by individuals who have careers in the Government & Public Administration career cluster.
	09.04 List the skills, abilities, and talents needed for careers in the Government & Public Administration career cluster.
	09.05 Identify the level of training and education required for careers in the Government & Public Administration career cluster.
	09.06 Research a career in the Government & Public Administration career cluster and present findings to the class.
	09.07 Apply math, science, and reading skills in the completion of a project or activity related to the Government & Public Administration career cluster.
10.0	Identify and explore careers in the Health Science cluster – the student will be able to:
	10.01 Identify the pathways in the Health Science career cluster and the careers in each pathway.
	10.02 Describe the types of places that employ individuals who have careers in the Health Science career cluster.
	10.03 Describe the variety of tasks performed by individuals who have careers in the Health Science career cluster.
	10.04 List the skills, abilities, and talents needed for careers in the Health Science career cluster.
	10.05 Identify the level of training and education required for careers in the Health Science career cluster.
	10.06 Research a career in the Health Science career cluster and present findings to the class.
	10.07 Apply math, science, and reading skills in the completion of a project or activity related to the Health Science career cluster.
11.0	Identify and explore careers in the Hospitality & Tourism cluster – the student will be able to:
	11.01 Identify the pathways in the Hospitality & Tourism career cluster and the careers in each pathway.
	11.02 Describe the types of places that employ individuals who have careers in the Hospitality & Tourism career cluster.
	11.03 Describe the variety of tasks performed by individuals who have careers in the Hospitality & Tourism career cluster.
	11.04 List the skills, abilities, and talents needed for careers in the Hospitality & Tourism career cluster.
	11.05 Identify the level of training and education required for careers in the Hospitality & Tourism career cluster.

CTE Standards and Benchmarks	
	11.06 Research a career in the Hospitality & Tourism career cluster and present findings to the class.
	11.07 Apply math, science, and reading skills in the completion of a project or activity related to the Hospitality & Tourism career cluster.
12.0	Identify and explore careers in the Human Services cluster – the student will be able to:
	12.01 Identify the pathways in the Human Services career cluster and the careers in each pathway.
	12.02 Describe the types of places that employ individuals who have careers in the Human Services career cluster.
	12.03 Describe the variety of tasks performed by individuals who have careers in the Human Services career cluster.
	12.04 List the skills, abilities, and talents needed for careers in the Human Services career cluster.
	12.05 Identify the level of training and education required for careers in the Human Services career cluster.
	12.06 Research a career in the Human Services career cluster and present findings to the class.
	12.07 Apply math, science, and reading skills in the completion of a project or activity related to the Human Services career cluster.
13.0	Identify and explore careers in the Information Technology cluster – the student will be able to:
	13.01 Identify the pathways in the Information Technology career cluster and the careers in each pathway.
	13.02 Describe the types of places that employ individuals who have careers in the Information Technology career cluster.
	13.03 Describe the variety of tasks performed by individuals who have careers in the Information Technology career cluster.
	13.04 List the skills, abilities, and talents needed for careers in the Information Technology career cluster.
	13.05 Identify the level of training and education required for careers in the Information Technology career cluster.
	13.06 Research a career in the Information Technology career cluster and present findings to the class.
	13.07 Apply math, science, and reading skills in the completion of a project or activity related to the Information Technology career cluster.
14.0	Identify and explore careers in the Law, Public Safety & Security cluster–The student will be able to:
	14.01 Identify the pathways in the Law, Public Safety & Security career cluster and the careers in each pathway.
	14.02 Describe the types of places that employ individuals who have careers in the Law, Public Safety & Security career cluster.
	14.03 Describe the variety of tasks performed by individuals who have careers in the Law, Public Safety & Security career cluster.
	14.04 List the skills, abilities, and talents needed for careers in the Law, Public Safety & Security career cluster.

CTE Standards and Benchmarks	
	14.05 Identify the level of training and education required for careers in the Law, Public Safety & Security career cluster.
	14.06 Research a career in the Law, Public Safety & Security career cluster and present findings to the class.
	14.07 Apply math, science, and reading skills in the completion of a project or activity related to the Law, Public Safety & Security career cluster.
15.0	Identify and explore careers in the Manufacturing cluster – the student will be able to:
	15.01 Identify the pathways in the Manufacturing career cluster and the careers in each pathway.
	15.02 Describe the types of places that employ individuals who have careers in the Manufacturing career cluster.
	15.03 Describe the variety of tasks performed by individuals who have careers in the Manufacturing career cluster.
	15.04 List the skills, abilities, and talents needed for careers in the Manufacturing career cluster.
	15.05 Identify the level of training and education required for careers in the Manufacturing career cluster.
	15.06 Research a career in the Manufacturing career cluster and present findings to the class.
	15.07 Apply math, science, and reading skills in the completion of a project or activity related to the Manufacturing career cluster.
16.0	Identify and explore careers in the Marketing, Sales & Service cluster – the student will be able to:
	16.01 Identify the pathways in the Marketing, Sales & Service career cluster and the careers in each pathway.
	16.02 Describe the types of places that employ individuals who have careers in the Marketing, Sales & Service career cluster.
	16.03 Describe the variety of tasks performed by individuals who have careers in the Marketing, Sales & Service career cluster.
	16.04 List the skills, abilities, and talents needed for careers in the Marketing, Sales & Service career cluster.
	16.05 Identify the level of training and education required for careers in the Marketing, Sales & Service career cluster.
	16.06 Research a career in the Marketing, Sales & Service career cluster and present findings to the class.
	16.07 Apply math, science, and reading skills in the completion of a project or activity related to the Marketing, Sales & Service career cluster.
17.0	Identify and explore careers in Engineering and Technology Education – the student will be able to:
	17.01 Identify the pathways in Engineering and Technology Education.
	17.02 Describe the types of places that employ individuals who have careers in Engineering and Technology Education.
	17.03 Describe the variety of tasks performed by individuals who have careers in Engineering and Technology Education.

CTE Standards and Benchmarks	
	17.04 List the skills, abilities, and talents needed for careers in Engineering and Technology Education.
	17.05 Identify the level of training and education required for careers in Engineering and Technology Education.
	17.06 Research a career in Engineering and Technology Education and present findings to the class.
	17.07 Apply math, science, and reading skills in the completion of a project or activity related to the Engineering and Technology Education.
18.0	Identify and explore careers in the Transportation & Logistics cluster – the student will be able to:
	18.01 Identify the pathways in the Transportation & Logistics career cluster and the careers in each pathway.
	18.02 Describe the types of places that employ individuals who have careers in the Transportation & Logistics career cluster.
	18.03 Describe the variety of tasks performed by individuals who have careers in the Transportation & Logistics career cluster.
	18.04 List the skills, abilities, and talents needed for careers in the Transportation & Logistics career cluster.
	18.05 Identify the level of training and education required for careers in the Transportation & Logistics career cluster.
	18.06 Research a career in the Transportation & Logistics career cluster and present findings to the class.
	18.07 Apply math, science, and reading skills in the completion of a project or activity related to the Transportation & Logistics career cluster.
19.0	Describe leadership skills – the student will be able to:
	19.01 Identify the Career and Technical Student Organization(s) that are appropriate for CTE programs in each of the career clusters.
	19.02 Describe the leadership opportunities available to members of the CTSOs identified above.
	19.03 Investigate the CTSOs at your school and/or in your school district (e.g., membership requirements, dues, activities, events).

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

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