Course Title: **Aerospace Technologies I**
Course Number: **8600580**
Course Credit: **1**

Course Description:
This course provides students with an introduction to the knowledge, human relations, and technological skills found today in Aerospace Technologies.

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

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:		SC.912.N.1.1
01.01	Discuss the nature and development of technological knowledge and processes.	LAFS.910.RI.2.4; 3.6	
01.02	Explain the rapid increase in the rate of technological development and diffusion.	LAFS.910.W.1.2	
01.03	Conduct specific goal-directed research related to inventions and innovations.	LAFS.910.W.3.7 MAFS.912.S-IC.2.6	
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:		SC.912.N.1.1, 3, 4, 7
02.01	Identify systems thinking logic and creativity with appropriate compromises in complex real-life problems.	LAFS.910.SL.1.1	
02.02	Define technological systems, which are the building blocks of technology and are embedded within larger technological, social, and environmental systems.	LAFS.910.SL.1.1	
02.03	Identify the stability of a technological system and its influence by all of the components in the system, especially those in the feedback loop.	LAFS.910.SL.1.1 LAFS.910.W.1.2	
02.04	Identify resources involving trade-offs between competing values, such as availability, cost, desirability, and waste.	LAFS.910.RI.1.1, 2	
02.05	Identify the criteria and constraints of a product or system and determine how they affect the final design and development.	LAFS.910.RI.1.1, 2	
02.06	Define a management system as the process of planning, organizing, and controlling work.	LAFS.910.RI.1.1, 2 LAFS.910.W.1.2	
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:		SC.912.N.1.1, 4, 5
03.01	Identify technology transfer occurring when a new user applies an existing innovation developed for one purpose in a different function.	LAFS.910.RI.1.1, 2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
03.02	Identify technological innovation resulting when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields.	LAFS.910.RI.1.1, 2	
03.03	Outline the process of patenting to protect a technological idea.	LAFS.910.RI.1.1, 2	
03.04	Identify technological progresses that promote the advancement of science and mathematics.	LAFS.910.RI.1.1, 2	
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:		SC.912.N.4.2
04.01	Classify the use of technology involving weighing the trade-offs between the positive and the negative effects.	LAFS.910.SL.1.1; 2.4 LAFS.910.RI.3.8	
04.02	Identify ethical considerations important in the development, selection, and use of technologies.	LAFS.910.SL.1.1; 2.4 LAFS.910.RI.3.8	
04.03	List the cultural, social, economic, and political changes caused by the transfer of a technology from one society to another.	LAFS.910.SL.1.1	
05.0	Demonstrate an understanding of the effects of technology on the environment. . – The student will be able to:		SC.912.L.17.16, 17, 20
05.01	List trade-offs of developing technologies to reduce the use of resources.	LAFS.910.RI.1.1, 2 LAFS.910.W.1.1; 3.8	
05.02	Identify technologies devised to reduce the negative consequences of other technologies.	LAFS.910.RI.1.1, 1.2 LAFS.910.W.1.1, 3.8	
05.03	Discuss the implementation of technologies involving the weighing of trade-offs between predicted positive and negative effects on the environment.	LAFS.910.RI.1.1, 2 LAFS.910.W.1.1; 3.8 LAFS.910.SL.2.4,5,6	
06.0	Demonstrate an understanding of the role of society in the development and use of technology. – The student will be able to:		
06.01	Investigate how different cultures develop their own technologies to satisfy their individual and shared needs, wants, and values.	LAFS.910.RI.1.1, 2 LAFS.910.W.1.1; 3.8	
06.02	Collect societal opinions and demands, as well as corporate cultures to use as a basis for deciding whether or not to develop a technology.	LAFS.910.RI.1.1, 2 LAFS.910.W.1.1; 3.8	
06.03	Identify a number of different factors, such as advertising, the strength of the economy, the goals of a company, and the latest fads as contributors to shaping the design of and demand for various technologies.	LAFS.910.RI.1.1, 2 LAFS.910.W.1.1, 2; 3.8	
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:		SC.912.N.2.4; 3.2
07.01	Research how the evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools and materials.	LAFS.910.RI.1.2 LAFS.910.W.3.7;4.10 LAFS.910.SL.1.1, 2; 2.4, 5, 6	
07.02	Define the history of technology as a powerful force in reshaping the social, cultural, political, and economic landscape.	LAFS.910.RI.1.2 LAFS.910.W.3.7;4.10 LAFS.910.SL.1.1, 2;	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		2.4, 5, 6	
07.03	Discuss that early in the history of technology, the development of many tools and machines was based not on scientific knowledge but on technological know-how.	LAFS.910.RI.1.2 LAFS.910.W.3.7;4.10 LAFS.910.SL.1.1, 2; 2.4, 5, 6	
07.04	Define the Iron Age as the use of iron and steel as the primary materials for tools.	LAFS.910.RI.1.2 LAFS.910.W.3.7;4.10 LAFS.910.SL.1.1, 2; 2.4, 5, 6	
07.05	Define the Industrial Revolution and the development of continuous manufacturing, sophisticated transportation and communication systems, advanced construction practices, and improved education and leisure time.	LAFS.910.RI.1.2 LAFS.910.W.3.7;4.10 LAFS.910.SL.1.1, 2; 2.4, 5, 6	
07.06	Define the Information Age and its placement of emphasis on the processing and exchange of information.	LAFS.910.RI.1.2 LAFS.910.W.3.7;4.10 LAFS.910.SL.1.1, 2; 2.4, 5, 6	
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:		SC.912.N.1.1, 3, 4, 5, 6, 7; 3.3, 5; 4.2
08.01	Recognize the design process; including defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results.	LAFS.910.RI.1.1 LAFS.910.W.3.8; 4.10 LAFS.910.L.3.6	
08.02	Restate design problems that are seldom presented in a clearly defined form.		
08.03	Check and critique a design continually, and improve and revise the idea of the design as needed.		
08.04	List competing requirements of a design, such as criteria, constraints, and efficiency.		
09.0	Demonstrate an understanding of engineering design. – The student will be able to:		SC.912.N.1.1, 3, 4, 5, 6, 7; 3.3, 5; 4.2
09.01	Identify design principles used to evaluate existing designs, to collect data, and to guide the design process.	MAFS.912.N-VM.1.1, 2, 3, 4, 5	
09.02	Describe the influence of personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly on the engineering design process.		
09.03	Construct a prototype or a working model used to test a design concept by making actual observations and necessary adjustments.		
09.04	Identify factors taken into account in the process of engineering.	MAFS.912.G-CO.1.1, 2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
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:		SC.912.N.1.1, 3, 4, 5, 6, 7; 2.1, 4, 5; 3.1, 3, 5; 4.2
10.01	Define research and development as a specific problem solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace.	LAFS.1112.W.2.4, 5, 6	
10.02	Identify research needed to solve technological problems.	LAFS.910.W.3.7	
10.03	Differentiate between technological and non-technological problems, and identify which problems can be solved using technology.		
10.04	Utilize a multidisciplinary approach to solving technological problems.		
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:		SC.912.N.1.1, 3, 4, 5, 6, 7; 3.3, 5; 4.2
11.01	Identify the design problem to solve and decide whether or not to address it.		
11.02	List criteria and constraints and determine how these will affect the design process.	MAFS.912.G-CO.1.1, 2	
11.03	Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product.		
11.04	Evaluate the design solution using conceptual, physical, and mathematical models at various intervals of the design process in order to check for proper design and to note areas where improvements are needed.		
11.05	Develop a product or system using a design process.	MAFS.912.G-CO.1.1, 2	
11.06	Evaluate final solutions and communicate observations, processes, and results of the entire design process, using verbal, graphic, quantitative, virtual, and written means, in addition to three-dimensional models.	LAFS.910.W.1.1, 2 LAFS.910.SL.2.4 MAFS.912.S-IC.1.6	
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:		SC.912.N.1.1
12.01	Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques.	LAFS.910.W.1.2 LAFS.910.SL.2.4	
12.02	Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it.	LAFS.910.RI.1.1	
12.03	Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision.	LAFS.910.RI.1.1	
12.04	Operate systems so that they function in the way they were designed.		
12.05	Use computers and calculators to access, retrieve, organize, process, maintain, interpret, and evaluate data and information in order to communicate.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:	MAFS.912.S-IC.2	SC.912.L.17.4, 16 SC.912.N.1.1, 4, 6
13.01	Collect information and evaluate its quality.	MAFS.912.S-IC.2.5	
13.02	Synthesize data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and the environment.	MAFS.912.S-IC.2.6	
13.03	Define assessment techniques, such as trend analysis and experimentation to make decisions about the future development of technology.		
13.04	Identify forecasting techniques to evaluate the results of altering natural systems.		
14.0	Demonstrate an understanding of and be able to select and use energy and power technologies. – The student will be able to:		SC.912.P.10.1, 3
14.01	Discuss how energy cannot be created nor destroyed; however, it can be converted from one form to another.	LAFS.910.SL.1.1	
14.02	Categorize types of energy into major forms: thermal, radiant, electrical, mechanical, chemical, nuclear, and others.		
14.03	Explain impossibility of building an engine to perform work that does not exhaust thermal energy to the surroundings.	LAFS.910.SL.1.1 LAFS.910.W.1.2	
14.04	Classify energy resources as renewable or nonrenewable.		
14.05	Construct a power system having a source of energy, a process, and loads.		
15.0	Demonstrate an understanding of and be able to select and use information and communication technologies. – The student will be able to:		
15.01	Discuss information and communication technologies including the inputs, processes, and outputs associated with sending and receiving information.	LAFS.910.SL.1.1	
15.02	Classify information and communication systems that allow information to be transferred as human to human, human to machine, machine to human, or machine to machine.	LAFS.910.RI.1.2	
15.03	Use information and communication systems to inform, persuade, entertain, control, manage, and educate.	LAFS.910.RI.1.2	
15.04	Identify components of a communications system, including source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.		
15.05	Identify many ways to communicate information, such as graphic and electronic means.		
15.06	Communicate technological knowledge and processes using symbols, measurement, conventions, icons, graphic images, and languages that incorporate a variety of visual, auditory, and tactile stimuli.		
16.0	Demonstrate an understanding of and be able to select and use transportation technologies. – The student will be able to:		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
16.01	Analyze the vital role played by transportation in the operation of other technologies, such as manufacturing, construction, communication, health and safety, and agriculture.	LAFS.910.RI.1.1	
16.02	Define intermodalism as the use of different modes of transportation, such as highways, railways, and waterways as part of an interconnected system that can move people and goods easily from one mode to another.	LAFS.910.L.3.6 LAFS.910.RI.1.1	
16.03	Discuss how transportation services and methods have led to a population that is regularly on the move.	LAFS.910.SL.1.1	
16.04	Identify processes and innovative techniques involved in the design of intelligent and non-intelligent transportation systems.	LAFS.910.RI.1.2	
17.0	Demonstrate safe and appropriate use of tools and machines in aviation/aerospace technologies. – The student will be able to:		
17.01	Select appropriate tools, procedures, and/or equipment.		
17.02	Demonstrate the safe usage of appropriate tools, procedures, and operation of equipment.		
17.03	Maintain and troubleshoot equipment used in a variety of technological systems.		
17.04	Follow laboratory safety rules and procedures.		
17.05	Demonstrate good housekeeping at workstation within total laboratory.		
17.06	Identify color-coding safety standards.		
17.07	Explain fire prevention and safety precautions and practices for extinguishing fires.		
17.08	Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.		
18.0	Demonstrate an understanding of the history and development of aviation and space transportation. – The student will be able to:		SC.912.E.5.7, 9
18.01	Describe early attempts at flight prior to the Wright Brothers flight in 1902.	LAFS.910.SL.2.4,5,6	
18.02	Outline the early attempts at heavier than air powered flight.	LAFS.910.W.4.10	
18.03	Describe the affect of air power on the outcome of world conflict.	LAFS.910.SL.2.4,5,6	
18.04	Describe the history of aviation in Florida.	LAFS.910.SL.2.4,5,6	
18.05	Outline the beginnings of commercial aviation.	LAFS.910.W.4.10	
18.06	Identify the early research centers for aeronautics in the United States.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
18.07	Describe the role of aviation research and development.	LAFS.910.SL.2.4,5,6	
18.08	Outline the development of space exploration.	LAFS.910.W.4.10	
18.09	Describe the role of NACA and NASA in the development of aeronautics and space exploration.	LAFS.910.SL.2.4,5,6	
18.10	Prepare a forecast of aerospace developments, and interplanetary space travel.	LAFS.910.SL.2.4	
19.0	Describe the aviation/aerospace environment. – The student will be able to:		SC.912.E.5.4, 6; 7.3, 4, 5, 6 SC.912.L.17.4; 18.12 SC.912.P.12.2, 3, 7
19.01	Identify atmospheric regions and elements.		
19.02	Describe the roles of water and particulate matter in the atmosphere.	LAFS.910.SL.2.4	
19.03	Describe and identify the elements of the atmosphere in motion.	LAFS.910.SL.2.4 MAFS.912.N-VM.2.4, 5	
19.04	Explain the role weather forecasting has as it relates to Aerospace Technologies.	LAFS.910.W.1.2	
19.05	Demonstrate an understanding of the principal bodies of the universe.		
19.06	Utilize astronomical principles, and technology to study the solar systems.		
19.07	Develop a radio telemetry system to measure temperature, pressure, humidity, or acceleration during a rocket flight.		
19.08	Define interplanetary space.	LAFS.910.L.3.6	
19.09	Describe the physical properties of interplanetary space including the structure, formation, forces, and bodies.	LAFS.910.SL.2.4, 5	
19.10	Describe interstellar and intergalactic space.	LAFS.910.SL.2.4, 5	
20.0	Describe and demonstrate an understanding of the principles of flight. – The student will be able to:		SC.912.P.10.1, 7; 12.2, 3
20.01	Define terminology associated with flight and flight principles.	LAFS.910.L.3.6	
20.02	Identify the structural components of aircraft.	LAFS.910.SL.1.1	
20.03	Construct and test flying models of lighter-than-air craft.		
20.04	Demonstrate an understanding of a powered aircraft and the use of control surfaces to control flight characteristics of pitch, yaw and roll.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	20.05 Demonstrate an understanding of rocketry design and systems.		
	20.06 Develop and construct models to test flight characteristics of powered aircraft.		
	20.07 Explain the application of Newton's laws to flight and rocketry.	LAFS.910.W.1.2 LAFS.910.SL.1.1	
21.0	Demonstrate an understanding of electrical, mechanical, fluid, and pneumatic systems that could be used on/in aviation/aerospace environments. – The student will be able to:		SC.912.P.10.1, 3; 12.2, 3
	21.01 Demonstrate the concepts of force, work, rate, resistance, energy and power through the use of various mechanical sub systems, include: gears, belts, valves, chains, pulleys, screws, cams, linkages, rods, and sprockets or mechanical trainers.	MAFS.912.A-CED.1.4	
	21.02 Demonstrate the concepts of force, work rate, resistance, and power through the use of various fluid subsystems, including: fluid manometers, hydraulic lifts, pipes, valves, tanks, air gauges of hydraulic trainers, and pneumatic trainers.	MAFS.912.A-CED.1.4	
	21.03 Demonstrate the concepts of force, work, rate, resistance, energy, and power through the use of various electrical sub system, including: conductors, control elements, electrical loads, voltage sources, current sources, circuits, components, and measurement equipment, or electrical/electronic trainers.	MAFS.912.A-CED.1.4	
22.0	Demonstrate an understanding of power systems including, internal combustion engines, jet engines, rocket engines, solar cells and nuclear power used in aviation/aerospace applications. – The student will be able to:		SC.912.N.1.1 SC.912.P.10.1, 7; 12.2, 3
	22.01 Identify the basic types of engines used for aircraft propulsion.	LAFS.910.SL.1.1	
	22.02 Describe the change from linear motion to rotary motion in a reciprocating engine.		
	22.03 Identify the elements of an aircraft engine and fuel system.	LAFS.910.SL.1.1	
	22.04 Describe the operation of aircraft turbine and ramjet engines.	LAFS.910.SL.1.1	
	22.05 Explain chemical propulsion systems.	LAFS.910.W.1.2	
	22.06 Explain advanced propulsion systems including heavy lift launch systems, electrical propulsion, and nuclear propulsion.	LAFS.910.SL.1.1; 2.5 LAFS.910.W.1.2	
	22.07 Describe the use and operation of solar cells to generate electrical power.	LAFS.910.SL.1.1; 2.5 LAFS.910.W.1.2	
	22.08 Perform experimental testing, including designing test devices to determine the power (thrust) of a model rocket engine.	LAFS.910.SL.1.1; 2.5 LAFS.910.W.1.2 MAFS.912.A-CED.1.4 MAFS.912.S-IC.2.6	
23.0	Demonstrate technical knowledge of computer control as it is related to aviation/aerospace projects. – The student will be able to:		SC.912.N.1.1, 3, 4, 5, 6, 7; 3.3, 5; 4.2

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
23.01	Demonstrate the application of a computer and software program to develop a plan for an aerospace vehicle.		
23.02	Demonstrate an ability to perform a milling, engraving or turning operation utilizing a computer assisted manufacturing program.		
23.03	Demonstrate problem-solving skills relative to computer assisted manufacturing related to the aerospace industry.		
23.04	Demonstrate an ability to develop programs to control flight operations and/or testing procedures.		
24.0	Demonstrate knowledge of robotics as it relates to the aviation/aerospace industry. – The student will be able to:		SC.912.N.1.1, 3, 4, 5, 6, 7; 3.3, 5; 4.2
24.01	Identify different types of robots.	LAFS.910.RI.1.1, 2	
24.02	State the function of effectors, sensors, controllers, and auxiliary parts in robotics system.		
24.03	Program a robot using a computer to perform a specific task.		
24.04	Explain how robotics technology is used in the space program.		
24.05	Demonstrate problem-solving skills using robotics technology as it applies to Aerospace Technologies experiments and programs.		
24.06	Forecast how robotics technology will be used in the exploration of space, space colonization or interplanetary space travel.		
25.0	Demonstrate a knowledge and understanding of processing skills on materials and composites as they relate to aviation/aerospace technologies. – The student will be able to:		
25.01	Identify tools, machines and equipment in the laboratory and explain their functions.	LAFS.910.RI.1.1, 2	
25.02	Select appropriate tools, machines and equipment to accomplish a given task.		
25.03	Demonstrate safe and correct use of tools, machines and equipment.		
25.04	Identify various industrial raw materials.	LAFS.910.RI.1.1	
25.05	Perform processing skills on materials and composites as needed to develop aerospace vehicles, models, experimental fixtures, and apparatus.		
27.0	Explore the role of civilian spacecraft in the exploration and colonization of space. – The student will be able to:		SC.912.E.5.6, 7, 10, 11
27.01	Participate in the development of a study for a model of manned interplanetary space travel.		
27.02	Develop a plan for scientific research to be performed on a space station facility.		
27.03	Develop a plan for flight crew training for a manned space flight.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
27.04	Research, develop, plan, and build model structures of space colonization structures.	LAFS.910.W.3.7 MAFS.912.G-CO.1.1, 2 MAFS.912.S-IC.2.6	
27.05	Develop plans, models and a visual presentation of a manned space flight to a distant planet in the solar system.	LAFS.910.W.3.8	
27.06	Examine methods of sending and receiving messages and controlling telemetry from space.		
28.0	Describe various factors critical to aircraft performance. – The student will be able to:		
28.01	Describe aircraft weight and balance terms and factors.	LAFS.910.RI.1.2 MAFS.921.N-VM.1.1, 2, 3, 4, 5	
28.02	Calculate an aircraft's center of gravity (CG).		
28.03	Describe how runway length affects aircraft performance.	LAFS.910.RI.1.2	
28.04	Describe how atmospheric pressure and altitude affects aircraft performance.	LAFS.910.RI.1.2 MAFS.912.F-TF.1.3; 2.5, 7	
28.05	Describe implications to aircraft performance under Visual Flight Rules (VFR) and Instrument Flight Rules (IFR) conditions.	LAFS.910.RI.1.2	
28.06	Describe class of airspace and discuss how it impacts aircraft performance.	LAFS.910.RI.1.2	
28.07	Discuss engine and fuel issues/conditions relative to aircraft performance.	LAFS.910.SL.1.1 MAFS.912.A-CED.1.4	
28.08	Explain the role of instrumentation relative to aircraft performance.	LAFS.910.SL.1.1 LAFS.910.W.1.2	
28.09	Describe how aircraft design impacts aircraft performance.	LAFS.910.W.1.2 LAFS.910.SL.2.4,5,6	
28.10	Describe how meteorological conditions affect aircraft performance.		
28.11	Explain how the type of aircraft (e.g., fixed wing, rotary wing, commercial, military, utility, etc.) impacts aircraft performance.	LAFS.910.W.1.2 LAFS.910.SL.2.4,5,6	

Course Title: **Aerospace Technologies II**
Course Number: **8600680**
Course Credit: **1**

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

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02.03	Assess the stability of a technological system and its influence by all of the components in the system, especially those in the feedback loop.	LAFS.910.SL.1.1 LAFS.910.W.1.2	
02.04	Select resources involving trade-offs between competing values, such as availability, cost, desirability, and waste.	LAFS.910.RI.1.1, 2	
02.05	Identify the criteria and constraints of a product or system and determine how they affect the final design and development.	LAFS.910.RI.1.1, 2	
02.06	Identify new technologies that create new processes.	LAFS.910.RI.1.1, 2	
02.07	Implement a quality control process to ensure that a product, service or system meets established criteria.	LAFS.910.RI.1.1, 2 LAFS.910.W.1.2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	02.08 Organize a management system as the process of planning, organizing, and controlling work.		
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:		SC.912.N.1.1, 4, 5
	03.01 Discuss technology transfer occurring when a new user applies an existing innovation developed for one purpose in a different function.	LAFS.910.SL.1.1 LAFS.910.W.4.10	
	03.02 Explain technological innovation resulting when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields.	LAFS.910.SL.1.1 LAFS.910.W.4.10	
	03.03 Discuss technological progresses that promote the advancement of science and mathematics.	LAFS.910.SL.1.1 LAFS.910.W.4.10	
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:		SC.912.N.4.2
	04.01 Compare the use of technology involving weighing the trade-offs between the positive and the negative effects.	LAFS.910.SL.1.1; 2.4 LAFS.910.RI.3.8	
	04.02 Discuss ethical considerations important in the development, selection, and use of technologies.	LAFS.910.SL.1.1; 2.4 LAFS.910.RI.3.8	
	04.03 Debate the cultural, social, economic, and political changes caused by the transfer of a technology from one society to another.	LAFS.910.SL.1.1	
05.0	Demonstrate an understanding of the effects of technology on the environment. . – The student will be able to:		SC.912.L.17.16, 17, 20
	05.01 Compare trade-offs of developing technologies to reduce the use of resources.	LAFS.910.RI.1.1 LAFS.910.W.1.1; 3.8 LAFS.910.SL.1.2	
	05.02 Assess technologies devised to reduce the negative consequences of other technologies.	LAFS.910.RI.1.1 LAFS.910.W.1.1; 3.8 LAFS.910.SL.1.2	
	05.03 Make decisions about the implementation of technologies involving the weighing of trade-offs between predicted positive and negative effects on the environment.	LAFS.910.RI.1.1 LAFS.910.W.1.1; 3.8 LAFS.910.SL.1.2	
06.0	Demonstrate an understanding of the role of society in the development and use of technology. – The student will be able to:		
	06.01 Report how different cultures develop their own technologies to satisfy their individual and shared needs, wants, and values.	LAFS.910.W.1.1	
	06.02 Consider societal opinions and demands, as well as corporate cultures to use as a basis for deciding whether or not to develop a technology.		
	06.03 Consider a number of different factors, such as advertising, the strength of the economy, the goals of a company, and the latest fads as contributors to shaping the design of and demand for various technologies.		
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:		SC.912.N.2.4; 3.2

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
07.01	Discuss how the evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools and materials.	LAFS.910.SL.1.1, 2; 2.4, 5, 6	
07.02	Research the history of technology as a powerful force in reshaping the social, cultural, political, and economic landscape.	LAFS.910.SL.1.1, 2; 2.4, 5, 6 LAFS.910.W.3.7, 8	
07.03	Debate that early in the history of technology, the development of many tools and machines was based not on scientific knowledge but on technological know-how.	LAFS.910.SL.1.1, 2; 2.4, 5, 6	
07.04	Discuss the Industrial Revolution and the development of continuous manufacturing, sophisticated transportation and communication systems, advanced construction practices, and improved education and leisure time.	LAFS.910.SL.1.1, 2; 2.4, 5, 6	
07.05	Discuss the Information Age and its placement of emphasis on the processing and exchange of information.		
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:		SC.912.N.1.1, 3, 4, 5, 6, 7; 3.3, 5; 4.2
08.01	Apply the design process; including defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results.		
08.02	Translate design problems that are seldom presented in a clearly defined form.		
08.03	Evaluate a design continually, and improve and revise the idea of the design as needed.		
08.04	Analyze competing requirements of a design, such as criteria, constraints, and efficiency.		
09.0	Demonstrate an understanding of engineering design. – The student will be able to:		SC.912.N.1.1, 3, 4, 5, 6, 7; 2.2; 3.3, 5; 4.2
09.01	Investigate design principles used to evaluate existing designs, to collect data, and to guide the design process.		
09.02	Examine the influence of personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly on the engineering design process.	MAFS.921.N-VM.1.1, 2, 3, 4, 5	
09.03	Construct a prototype or a working model used to test a design concept by making actual observations and necessary adjustments.		
09.04	Evaluate factors taken into account in the process of engineering.	MAFS.912.G-CO.1.1, 2	
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:		SC.912.N.1.1, 3, 4, 5, 6, 7; 2.1, 4, 5; 3.1, 3, 5; 4.2

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
10.01	Employ research and development as a specific problem solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace.	LAFS.1112.W.2.4, 5, 6	
10.02	Conduct research needed to solve technological problems.	LAFS.910.W.3.7	
10.03	Differentiate between technological and non-technological problems, and identify which problems can be solved using technology.		
10.04	Utilize a multidisciplinary approach to solving technological problems.		
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:		SC.912.N.1.1, 3, 4, 5, 6, 7; 3.3, 5; 4.2
11.01	Interpret the design problem to solve and decide whether or not to address it.		
11.02	Evaluate criteria and constraints and determine how these will affect the design process.	MAFS.912.G-CO.1.1, 2	
11.03	Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product.		
11.04	Evaluate the design solution using conceptual, physical, and mathematical models at various intervals of the design process in order to check for proper design and to note areas where improvements are needed.		
11.05	Produce a product or system using a design process.	MAFS.912.G-CO.1.1, 2	
11.06	Evaluate final solutions and communicate observations, processes, and results of the entire design process, using verbal, graphic, quantitative, virtual, and written means, in addition to three-dimensional models.	LAFS.910.W.1.1, 2 LAFS.910.SL.2.4 MAFS.912.S-IC.2.6	
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:		SC.912.N.1.1
12.01	Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques.	LAFS.910.W.1.1 LAFS.910.SL.2.4	
12.02	Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it.	LAFS.910.RI.1.1	
12.03	Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision.	LAFS.910.RI.1.1	
12.04	Operate systems so that they function in the way they were designed.		
12.05	Use computers and calculators to access, retrieve, organize, process, maintain, interpret, and evaluate data and information in order to communicate.		
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:	MAFS.912.S-IC.2	SC.912.L.17.4, 16 SC.912.N.1.1, 4, 6
13.01	Collect information and evaluate its quality.	MAFS.912.S-IC.2.5	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
13.02	Synthesize data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and the environment.	MAFS.912.S-IC.2.6	
13.03	Apply assessment techniques, such as trend analysis and experimentation to make decisions about the future development of technology.	MAFS.912.S-IC.2.6	
13.04	Design forecasting techniques to evaluate the results of altering natural systems.		
14.0	Demonstrate an understanding of and be able to select and use energy and power technologies. – The student will be able to:		SC.912.P.10.1, 3
14.01	Discuss how energy cannot be created nor destroyed; however, it can be converted from one form to another.	LAFS.910.SL.1.1	
14.02	Categorize types of energy into major forms: thermal, radiant, electrical, mechanical, chemical, nuclear, and others.		
14.03	Explain impossibility of building an engine to perform work that does not exhaust thermal energy to the surroundings.	LAFS.910.SL.1.1 LAFS.910.W.1.2	
14.04	Classify energy resources as renewable or nonrenewable.		
14.05	Construct a power system having a source of energy, a process, and loads.		
15.0	Demonstrate an understanding of and be able to select and use information and communication technologies. – The student will be able to:		
15.01	Discuss information and communication technologies including the inputs, processes, and outputs associated with sending and receiving information.	LAFS.910.SL.1.1	
15.02	Classify information and communication systems that allow information to be transferred as human to human, human to machine, machine to human, or machine to machine.	LAFS.910.SL.1.2	
15.03	Use information and communication systems to inform, persuade, entertain, control, manage, and educate.	LAFS.910.SL.1.2	
15.04	Identify components of a communications system, including source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.		
15.05	Identify many ways to communicate information, such as graphic and electronic means.		
15.06	Communicate technological knowledge and processes using symbols, measurement, conventions, icons, graphic images, and languages that incorporate a variety of visual, auditory, and tactile stimuli.		
16.0	Demonstrate an understanding of and be able to select and use transportation technologies. – The student will be able to:		
16.01	Analyze the vital role played by transportation in the operation of other technologies, such as manufacturing, construction, communication, health and safety, and agriculture.	LAFS.910.RI.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
16.02	Define intermodalism as the use of different modes of transportation, such as highways, railways, and waterways as part of an interconnected system that can move people and goods easily from one mode to another.	LAFS.910.RI.1.1 LAFS.910.L.3.6	
16.03	Discuss how transportation services and methods have led to a population that is regularly on the move.	LAFS.910.SL.1.1	
16.04	Identify processes and innovative techniques involved in the design of intelligent and non-intelligent transportation systems.	LAFS.910.RI.1.2	
17.0	Demonstrate safe and appropriate use of tools and machines in aviation/aerospace technologies. – The student will be able to:		
17.01	Select appropriate tools, procedures, and/or equipment.		
17.02	Demonstrate the safe usage of appropriate tools, procedures, and operation of equipment.		
17.03	Maintain and troubleshoot equipment used in a variety of technological systems.		
17.04	Follow laboratory safety rules and procedures.	LAFS.910.RI.1.2	
17.05	Demonstrate good housekeeping at workstation within total laboratory.		
17.06	Identify color-coding safety standards.		
17.07	Explain fire prevention and safety precautions and practices for extinguishing fires.		
17.08	Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.		
18.0	Demonstrate an understanding of the history and development of aviation and space transportation. – The student will be able to:		SC.912.E.5.7, 9
18.01	Describe early attempts at flight prior to the Wright Brothers flight in 1902.	LAFS.910.W.4.10	
18.02	Outline the early attempts at heavier than air powered flight.	LAFS.910.W. 4.10	
18.03	Describe the affect of air power on the outcome of world conflict.	LAFS.910.W. 4.10 LAFS.910.SL.2.4, 5	
18.04	Describe the history of aviation in Florida.	LAFS.910.W. 4.10 LAFS.910.SL.2.6	
18.05	Outline the beginnings of commercial aviation.	LAFS.910.W. 4.10 LAFS.910.SL.2.6	
18.06	Identify the early research centers for aeronautics in the United States.	LAFS.910.W. 4.10 LAFS.910.SL.2.6	
18.07	Describe the role of aviation research and development.	LAFS.910.W. 4.10 LAFS.910.SL.2.6	
18.08	Outline the development of space exploration.	LAFS.910.W. 4.10	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
18.09	Describe the role of NACA and NASA in the development of aeronautics and space exploration.	LAFS.910.W. 4.10	
18.10	Prepare a forecast of aerospace developments, and interplanetary space travel.	LAFS.910.SL.2.4	
19.0	Describe the aviation/aerospace environment. – The student will be able to:		SC.912.E.5.4, 6; 7.3, 4, 5, 6; SC.912.L.17.4; 18.12 SC.912.P.12.2, 3, 7
19.01	Identify atmospheric regions and elements.		
19.02	Describe the roles of water and particulate matter in the atmosphere.	LAFS.910.SL.2.4	
19.03	Describe and identify the elements of the atmosphere in motion.	LAFS.910.SL.2.4 MAFS.912.N-VM.2.4, 5	
19.04	Explain the role weather forecasting has as it relates to Aerospace Technologies.	LAFS.910.W. 1.2	
19.05	Demonstrate an understanding of the principal bodies of the universe.		
19.06	Utilize astronomical principles, and technology to study the solar systems.		
19.07	Develop a radio telemetry system to measure temperature, pressure, humidity, or acceleration during a rocket flight.		
19.08	Define interplanetary space.	LAFS.910.L.3.6	
19.09	Describe the physical properties of interplanetary space including the structure, formation, forces, and bodies.	LAFS.910.SL.2.4, 5	
19.10	Describe interstellar and intergalactic space.	LAFS.910.SL.2.4, 5	
20.0	Describe and demonstrate an understanding of the principles of flight. – The student will be able to:		SC.912.P.10.1, 7; 12.2, 3
20.01	Define terminology associated with flight and flight principles.	LAFS.910.L.3.6	
20.02	Identify the structural components of aircraft.	LAFS.910.SL.1.1	
20.03	Construct and test flying models of lighter-than-air craft.		
20.04	Demonstrate an understanding of a powered aircraft and the use of control surfaces to control flight characteristics of pitch, yaw and roll.		
20.05	Demonstrate an understanding of rocketry design and systems.		
20.06	Develop and construct models to test flight characteristics of powered aircraft.		
20.07	Explain the application of Newton's laws to flight and rocketry.	LAFS.910.SL.1.1 LAFS.910.W.1.2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
21.0	Demonstrate an understanding of electrical, mechanical, fluid, and pneumatic systems that could be used on/in aviation/aerospace environments. – The student will be able to:		SC.912.P.10.1, 3; 12.2, 3
21.01	Demonstrate the concepts of force, work, rate, resistance, energy and power through the use of various mechanical sub systems, include: gears, belts, valves, chains, pulleys, screws, cams, linkages, rods, and sprockets or mechanical trainers.	MAFS.912.A-CED.1.4	
21.02	Demonstrate the concepts of force, work rate, resistance, and power through the use of various fluid subsystems, including: fluid manometers, hydraulic lifts, pipes, valves, tanks, air gauges of hydraulic trainers, and pneumatic trainers.	MAFS.912.A-CED.1.4	
21.03	Demonstrate the concepts of force, work, rate, resistance, energy, and power through the use of various electrical sub system, including: conductors, control elements, electrical loads, voltage sources, current sources, circuits, components, and measurement equipment, or electrical/electronic trainers.	MAFS.912.A-CED.1.4	
22.0	Demonstrate an understanding of power systems including, internal combustion engines, jet engines, rocket engines, solar cells and nuclear power used in aviation/aerospace applications. – The student will be able to:		SC.912.N.1.1, SC.912.P.10.1, 7; 12.2, 3
22.01	Identify the basic types of engines used for aircraft propulsion.	LAFS.910.SL.1.1	
22.02	Describe the change from linear motion to rotary motion in a reciprocating engine.	LAFS.910.W.1.2	
22.03	Identify the elements of an aircraft engine and fuel system.	LAFS.910.SL.1.1	
22.04	Describe the operation of aircraft turbine and ramjet engines.	LAFS.910.SL.1.1	
22.05	Explain chemical propulsion systems.	LAFS.910.W.1.2	
22.06	Explain advanced propulsion systems including heavy lift launch systems, electrical propulsion, and nuclear propulsion.	LAFS.910.SL.1.1; 2.5	
22.07	Describe the use and operation of solar cells to generate electrical power.		
22.08	Perform experimental testing, including designing test devices to determine the power (thrust) of a model rocket engine.	MAFS.912.A-CED.1.4 MAFS.912.S-IC.2.6	
23.0	Demonstrate technical knowledge of computer control as it is related to aviation/aerospace projects. – The student will be able to:		SC.912.N.1.1, 3, 4, 5, 6, 7; 3.3, 5; 4.2
23.01	Demonstrate the application of a computer and software program to develop a plan for an aerospace vehicle.		
23.02	Demonstrate an ability to perform a milling, engraving or turning operation utilizing a computer assisted manufacturing program.		
23.03	Demonstrate problem-solving skills relative to computer assisted manufacturing related to the aerospace industry.		
23.04	Demonstrate an ability to develop programs to control flight operations and/or testing procedures.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
24.0	Demonstrate knowledge of robotics as it relates to the aviation/aerospace industry. – The student will be able to:		SC.912.N.1.1, 3, 4, 5, 6, 7; 3.3, 5; 4.2
24.01	Identify different types of robots.	LAFS.910.R.1.1, 2	
24.02	State the function of effectors, sensors, controllers, and auxiliary parts in robotics system.		
24.03	Program a robot using a computer to perform a specific task.		
24.04	Explain how robotics technology is used in the space program.		
24.05	Demonstrate problem-solving skills using robotics technology as it applies to Aerospace Technologies experiments and programs.		
24.06	Forecast how robotics technology will be used in the exploration of space, space colonization or interplanetary space travel.		
25.0	Demonstrate knowledge and understanding of processing skills on materials and composites as they relate to aviation/aerospace technologies. – The student will be able to:		
25.01	Identify tools, machines and equipment in the laboratory and explain their functions.	LAFS.910.R.1.1, 2	
25.02	Select appropriate tools, machines and equipment to accomplish a given task.		
25.03	Demonstrate safe and correct use of tools, machines and equipment.		
25.04	Identify various industrial raw materials.		
25.05	Perform processing skills on materials and composites as needed to develop aerospace vehicles, models, experimental fixtures, and apparatus.		
26.0	Describe and demonstrate principles of navigation. – The student will be able to:	MAFS.912.S-IC.2	SC.912.E.5.5, 10, 11 SC.912.P.12.1, 7, 9
26.01	Describe navigation principles as they relate to aeronautical travel.	LAFS.910.R.1.2	
26.02	Demonstrate and ability to read and use an aeronautical navigational chart.	LAFS.910.L.3.6	
26.03	Examine navigational technologies and systems as they relate to aeronautical systems.		
26.04	Complete a flight plan for a fixed wing aircraft, from destination to destination.		
26.05	Demonstrate an understanding and application of mathematical concepts as they relate to determining space flight mechanics.		
26.06	Demonstrate an ability to compute a space flight orbit.		
26.07	Define and describe a variety of orbital patterns.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
30.0	Demonstrate an understanding of the effects of flight as it relates to physiology. – The student will be able to:		SC.912.L.14.21, 22, 29, 30, 34, 36, 39 42, 43, 44, 46, 49
30.01	Construct human data charts to determine the variation in body dimensions of human subjects.	MAFS.912.S-IC.2.6	
30.02	Evaluate products and fixtures used in aerospace environments and assess their suitability for human use.		
30.03	Develop test procedures for measuring human performance including but not limited to: visual perception, ability to withstand stress, ability to live in a restricted environment, requirements for nutrition, exercise and other physical needs as may be determined by research and development of aerospace projects.		
31.0	Perform advanced study and technical skills related to aviation/aerospace technologies. – The student will be able to:		SC.912.N.1.1, 3, 4, 5, 6, 7; 3.3, 5; 4.2
31.01	Identify an aerospace problem or product for improvement using the design methodology.		
31.02	Develop a written plan of work for the design team to carry out the project.	LAFS.910.W.1.2	
31.03	Show evidence of technical study in support of the project.	LAFS.910.W.1.1	
31.04	Perform skills related to the aerospace project.		
31.05	Complete the project as planned.		
31.06	Demonstrate or present the design solution to the problem.	LAFS.910.SL.2.4,5,6	

Course Title: **Aerospace Technologies III**
Course Number: **8601780**
Course Credit: **1**

Course Description:
This program provides students with an advanced understanding of the knowledge, human relations, and technological skills found today in Aerospace Technologies.

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

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
01.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:		SC.912.N.1.1
01.01	Discuss the nature and development of technological knowledge and processes.	LAFS.1112.RI.2.4	
01.02	Explain the rapid increase in the rate of technological development and diffusion.	LAFS.1112.W.1.2	
01.03	Conduct specific goal-directed research related to inventions and innovations.	LAFS.1112.W.3.7 MAFS.912.S-IC.2.6	
02.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:		SC.912.N.1.1, 3, 4, 7
02.01	Apply systems thinking logic and creativity with appropriate compromises in complex real-life problems.	LAFS.1112.SL.1.1	
02.02	Assess technological systems, which are the building blocks of technology and are embedded within larger technological, social, and environmental systems.	LAFS.1112.SL.1.1	
02.03	Assess the stability of a technological system and its influence by all of the components in the system, especially those in the feedback loop.	LAFS.1112. SL.1.1 LAFS.1112.W.1.2	
02.04	Compare resources involving trade-offs between competing values, such as availability, cost, desirability, and waste.	LAFS.1112.RI.1.1, 2	
02.05	Identify the criteria and constraints of a product or system and determine how they affect the final design and development.	LAFS.1112.RI.1.1, 2	
02.06	Identify new technologies that create new processes.	LAFS.1112.RI.1.1, 2	
02.07	Propose a quality control process to ensure that a product, service or system meets established criteria.	LAFS.1112.RI.1.1, 2 LAFS.1112.W.1.2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	02.08 Organize a management system as the process of planning, organizing, and controlling work.		
	02.09 Outline complex systems that have many layers of controls and feedback loops to provide information.		
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:		SC.912.N.1.1, 4, 5
	03.01 Discuss technology transfer occurring when a new user applies an existing innovation developed for one purpose in a different function.	LAFS.1112.SL.1.1 LAFS.1112.W.4.10	
	03.02 Examine technological innovation resulting when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields.	LAFS.1112. SL.1.1 LAFS.1112.W.4.10	
	03.03 Investigate technological progresses that promote the advancement of science and mathematics.	LAFS.1112. SL.1.1 LAFS.1112.W.4.10	
04.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:		SC.912.N.4.2
	04.01 Evaluate the use of technology involving weighing the trade-offs between the positive and the negative effects.	LAFS.1112.SL.1.1; 2.4 LAFS.1112.RI.3.8	
	04.02 Discuss ethical considerations important in the development, selection, and use of technologies.	LAFS.1112.SL.1.1; 2.4 LAFS.1112.RI.3.8	
	04.03 Debate the cultural, social, economic, and political changes caused by the transfer of a technology from one society to another.	LAFS.1112.SL.1.1	
05.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:		SC.912.L.17.16, 17, 20
	05.01 Consider trade-offs of developing technologies to reduce the use of resources.	LAFS.1112.RI.1.1 LAFS.1112.W.1.1;3.8 LAFS.1112.SL.1.2	
	05.02 Assess technologies devised to reduce the negative consequences of other technologies.	LAFS.1112.RI.1.1 LAFS.1112.W.1.1;3.8 LAFS.1112.SL.1.2	
	05.03 Make decisions about the implementation of technologies involving the weighing of trade-offs between predicted positive and negative effects on the environment.	LAFS.1112.RI.1.1 LAFS.1112.W.1.1;3.8 LAFS.1112. SL.1.2	
06.0	Demonstrate an understanding of the role of society in the development and use of technology. – The student will be able to:		
	06.01 Report how different cultures develop their own technologies to satisfy their individual and shared needs, wants, and values.		
	06.02 Consider societal opinions and demands, as well as corporate cultures to use as a basis for deciding whether or not to develop a technology.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
06.03	Evaluate a number of different factors, such as advertising, the strength of the economy, the goals of a company, and the latest fads as contributors to shaping the design of and demand for various technologies.		
07.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:		SC.912.N.2.4; 3.2
07.01	Discuss how the evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools and materials.	LAFS.1112.SL.1.1, 2; 2.4, 5, 6	
07.02	Research the history of technology as a powerful force in reshaping the social, cultural, political, and economic landscape.	LAFS.1112.SL.1.1, 2; 2.4, 5, 6 LAFS.1112. W.3.7, 8	
07.03	Debate that early in the history of technology, the development of many tools and machines was based not on scientific knowledge but on technological know-how.	LAFS.1112.SL.1.1, 2; 2.4, 5, 6	
08.0	Demonstrate an understanding of the attributes of design. – The student will be able to:		SC.912.N.1.1, 3, 4, 5, 6, 7; 3.3, 5; 4.2
08.01	Apply the design process; including defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results.		
08.02	Translate design problems that are seldom presented in a clearly defined form.		
08.03	Evaluate a design continually, and improve and revise the idea of the design as needed.		
08.04	Analyze competing requirements of a design, such as criteria, constraints, and efficiency.		
09.0	Demonstrate an understanding of engineering design. – The student will be able to:		SC.912.N.1.1, 3, 4, 5, 6, 7; 2.2; 3.3, 5; 4.2
09.01	Investigate design principles used to evaluate existing designs, to collect data, and to guide the design process.		
09.02	Examine the influence of personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly on the engineering design process.	MAFS.921.N-VM.1.1, 2, 3, 4, 5	
09.03	Construct a prototype or a working model used to test a design concept by making actual observations and necessary adjustments.		
09.04	Evaluate factors taken into account in the process of engineering.	MAFS.912.G-CO.1.1, 2	
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:		SC.912.N.1.1, 3, 4, 5, 6, 7; 2.1, 4, 5; 3.1, 3, 5; 4.2

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
10.01	Employ research and development as a specific problem solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace.	LAFS.1112.W.2.4,5,6	
10.02	Conduct research needed to solve technological problems.	LAFS.1112.W.3.7	
10.03	Differentiate between technological and non-technological problems, and identify which problems can be solved using technology.		
10.04	Utilize a multidisciplinary approach to solving technological problems.		
11.0	Demonstrate the abilities to apply the design process. – The student will be able to:		SC.912.N.1.1, 3, 4, 5, 6, 7; 3.3, 5; 4.2
11.01	Interpret the design problem to solve and decide whether or not to address it.		
11.02	Evaluate criteria and constraints and determine how these will affect the design process.	MAFS.912.G-CO.1.1, 2	
11.03	Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product.		
11.04	Evaluate the design solution using conceptual, physical, and mathematical models at various intervals of the design process in order to check for proper design and to note areas where improvements are needed.		
11.05	Produce a product or system using a design process.	MAFS.912.G-CO.1.1, 2	
11.06	Evaluate final solutions and communicate observations, processes, and results of the entire design process, using verbal, graphic, quantitative, virtual, and written means, in addition to three-dimensional models.	LAFS.1112.W.1.1, 2 LAFS.1112.SL.2.4 MAFS.912.S-IC.1.6	
12.0	Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:		SC.912.N.1.1
12.01	Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques.	LAFS.1112.W.1.2 LAFS.1112.SL.2.4	
12.02	Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it.	LAFS.1112.R.1.1	
12.03	Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision.	LAFS.1112.R.1.1	
12.04	Operate systems so that they function in the way they were designed.		
12.05	Use computers and calculators to access, retrieve, organize, process, maintain, interpret, and evaluate data and information in order to communicate.		
13.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:	MAFS.912.S-IC.2	SC.912.L.17.4, 16 SC.912.N.1.1, 4, 6
13.01	Collect information and evaluate its quality.	MAFS.912.S-IC.2.5	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
13.02	Synthesize data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and the environment.	MAFS.912.S-IC.2.6	
13.03	Apply assessment techniques, such as trend analysis and experimentation to make decisions about the future development of technology.	MAFS.912.S-IC.2.6	
13.04	Design forecasting techniques to evaluate the results of altering natural systems.		
14.0	Demonstrate an understanding of and be able to select and use energy and power technologies. – The student will be able to:		SC.912.P.10.1, 3
14.01	Discuss how energy cannot be created nor destroyed; however, it can be converted from one form to another.	LAFS.1112.SL.1.1	
14.02	Categorize types of energy into major forms: thermal, radiant, electrical, mechanical, chemical, nuclear, and others.		
14.03	Explain impossibility of building an engine to perform work that does not exhaust thermal energy to the surroundings.	LAFS.1112.SL.1.1 LAFS.1112.W.1.2	
14.04	Classify energy resources as renewable or nonrenewable.		
14.05	Construct a power system having a source of energy, a process, and loads.		
15.0	Demonstrate an understanding of and be able to select and use information and communication technologies. – The student will be able to:		
15.01	Discuss information and communication technologies including the inputs, processes, and outputs associated with sending and receiving information.	LAFS.1112.SL.1.1	
15.02	Classify information and communication systems that allow information to be transferred as human to human, human to machine, machine to human, or machine to machine.	LAFS.1112.RI.1.2	
15.03	Use information and communication systems to inform, persuade, entertain, control, manage, and educate.	LAFS.1112.RI.1.2	
15.04	Identify components of a communications system, including source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.		
15.05	Identify many ways to communicate information, such as graphic and electronic means.		
15.06	Communicate technological knowledge and processes using symbols, measurement, conventions, icons, graphic images, and languages that incorporate a variety of visual, auditory, and tactile stimuli.		
16.0	Demonstrate an understanding of and be able to select and use transportation technologies. – The student will be able to:		
16.01	Analyze the vital role played by transportation in the operation of other technologies, such as manufacturing, construction, communication, health and safety, and agriculture.	LAFS.1112.RI.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
16.02	Define intermodalism as the use of different modes of transportation, such as highways, railways, and waterways as part of an interconnected system that can move people and goods easily from one mode to another.	LAFS.1112.RI.1.2 LAFS.1112.L.3.6	
16.03	Discuss how transportation services and methods have led to a population that is regularly on the move.	LAFS.1112.SL.1.1	
16.04	Identify processes and innovative techniques involved in the design of intelligent and non-intelligent transportation systems.	LAFS.1112.RI.1.2	
17.0	Demonstrate safe and appropriate use of tools and machines in aviation/aerospace technologies. – The student will be able to:		
17.01	Select appropriate tools, procedures, and/or equipment.		
17.02	Demonstrate the safe usage of appropriate tools, procedures, and operation of equipment.		
17.03	Maintain and troubleshoot equipment used in a variety of technological systems.		
17.04	Follow laboratory safety rules and procedures.	LAFS.1112.RI.1.2	
17.05	Demonstrate good housekeeping at workstation within total laboratory.		
17.06	Identify color-coding safety standards.		
17.07	Explain fire prevention and safety precautions and practices for extinguishing fires.		
17.08	Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.		
19.0	Describe the aviation/aerospace environment. – The student will be able to:		SC.912.E.5.4, 6; 7.3, 4, 5, 6 SC.912.L.17.4; 18.12 SC.912.P.12.2, 3, 7
19.01	Identify atmospheric regions and elements.		
19.02	Describe the roles of water and particulate matter in the atmosphere.	LAFS.1112.SL.2.4	
19.03	Describe and identify the elements of the atmosphere in motion.	LAFS.1112.SL.2.4	
19.04	Explain the role weather forecasting has as it relates to Aerospace Technologies.	LAFS.1112.W.1.2 MAFS.912.N-VM.2.4, 5	
19.05	Demonstrate an understanding of the principal bodies of the universe.		
19.06	Utilize astronomical principles, and technology to study the solar systems.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
19.07	Develop a radio telemetry system to measure temperature, pressure, humidity, or acceleration during a rocket flight.		
19.08	Define interplanetary space.	LAFS.1112.L.3.6	
19.09	Describe the physical properties of interplanetary space including the structure, formation, forces, and bodies.	LAFS.1112.SL.2.4, 5	
19.10	Describe interstellar and intergalactic space.	LAFS.1112.SL.2.4, 5	
20.0	Describe and demonstrate an understanding of the principles of flight. – The student will be able to:		SC.912.P.10.1, 7; 12.2, 3
20.01	Define terminology associated with flight and flight principles.	LAFS.1112.L.3.6	
20.02	Identify the structural components of aircraft.	LAFS.1112.SL.1.1	
20.03	Construct and test flying models of lighter-than-air craft.		
20.04	Demonstrate an understanding of a powered aircraft and the use of control surfaces to control flight characteristics of pitch, yaw and roll.		
20.05	Demonstrate an understanding of rocketry design and systems.		
20.06	Develop and construct models to test flight characteristics of powered aircraft.		
20.07	Explain the application of Newton's laws to flight and rocketry.	LAFS.1112.W.1.2 LAFS.1112.SL.1.1	
21.0	Demonstrate an understanding of electrical, mechanical, fluid, and pneumatic systems that could be used on/in aviation/aerospace environments. – The student will be able to:		SC.912.P.10.1, 3; 12.2, 3
21.01	Demonstrate the concepts of force, work, rate, resistance, energy and power through the use of various mechanical sub systems, include: gears, belts, valves, chains, pulleys, screws, cams, linkages, rods, and sprockets or mechanical trainers.	MAFS.912.A-CED.1.4	
21.02	Demonstrate the concepts of force, work rate, resistance, and power through the use of various fluid subsystems, including: fluid manometers, hydraulic lifts, pipes, valves, tanks, air gauges of hydraulic trainers, and pneumatic trainers.	MAFS.912.A-CED.1.4	
21.03	Demonstrate the concepts of force, work, rate, resistance, energy, and power through the use of various electrical sub system, including: conductors, control elements, electrical loads, voltage sources, current sources, circuits, components, and measurement equipment, or electrical/electronic trainers.	MAFS.912.A-CED.1.4	
23.0	Demonstrate technical knowledge of computer control as it is related to aviation/aerospace projects. – The student will be able to:		SC.912.N.1.1, 3, 4, 5, 6, 7; 3.3, 5; 4.2
23.01	Demonstrate the application of a computer and software program to develop a plan for an aerospace vehicle.		
23.02	Demonstrate an ability to perform a milling, engraving or turning operation utilizing a computer assisted manufacturing program.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
23.03	Demonstrate problem-solving skills relative to computer assisted manufacturing related to the aerospace industry.		
23.04	Demonstrate an ability to develop programs to control flight operations and/or testing procedures.		
24.0	Demonstrate knowledge of robotics as it relates to the aviation/aerospace industry. – The student will be able to:		SC.912.N.1.1, 3, 4, 5, 6, 7; 3.3, 5; 4.2
24.01	Identify different types of robots.	LAFS.1112.RI.1.1, 2	
24.02	State the function of effectors, sensors, controllers, and auxiliary parts in robotics system.		
24.03	Program a robot using a computer to perform a specific task.		
24.04	Explain how robotics technology is used in the space program.		
24.05	Demonstrate problem-solving skills using robotics technology as it applies to Aerospace Technologies experiments and programs.		
24.06	Forecast how robotics technology will be used in the exploration of space, space colonization or interplanetary space travel.		
25.0	Demonstrate knowledge and understanding of processing skills on materials and composites as they relate to aviation/aerospace technologies. – The student will be able to:		
25.01	Identify tools, machines and equipment in the laboratory and explain their functions.	LAFS.1112.RI.1.1, 2	
25.02	Select appropriate tools, machines and equipment to accomplish a given task.		
25.03	Demonstrate safe and correct use of tools, machines and equipment.		
25.04	Identify various industrial raw materials.	LAFS.1112.RI.1.1	
25.05	Perform processing skills on materials and composites as needed to develop aerospace vehicles, models, experimental fixtures, and apparatus.		
26.0	Describe and demonstrate principles of navigation. – The student will be able to:	MAFS.912.S-IC.2	SC.912.E.5.5, 10, 11 SC.912.P.12.1, 7, 9
26.01	Describe navigation principles as they relate to aeronautical travel.		
26.02	Demonstrate and ability to read and use an aeronautical navigational chart.		
26.03	Examine navigational technologies and systems as they relate to aeronautical systems.		
26.04	Complete a flight plan for a fixed wing aircraft, from destination to destination.		
26.05	Demonstrate an understanding and application of mathematical concepts as they relate to determining space flight mechanics.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	26.06 Demonstrate an ability to compute a space flight orbit.		
	26.07 Define and describe a variety of orbital patterns.		
27.0	Explore the role of civilian spacecraft in the exploration and colonization of space. – The student will be able to:		SC.912.E.5.6,7,10,11
	27.01 Participate in the development of a study for a model of manned interplanetary space travel.	LAFS.1112.RI.1.2	
	27.02 Develop a plan for scientific research to be performed on a space station facility.		
	27.03 Develop a plan for flight crew training for a manned space flight.		
	27.04 Research, develop, plan, and build model structures of space colonization structures.	LAFS.1112.W.3.7 MAFS.912.G-CO.1.1, 2 MAFS.912.S-IC.2.6	
	27.05 Develop plans, models and a visual presentation of a manned space flight to a distant planet in the solar system.	LAFS.1112.W.3.8 MAFS.912.G-CO.1.1, 2 MAFS.912.S-IC.2.6	
	27.06 Examine methods of sending and receiving messages and controlling telemetry from space.		
29.0	Demonstrate appropriate skills in analyzing and evaluating technological advancements as reported by the media. – The student will be able to:		
	29.01 Distinguish between verifying facts and claims.		
	29.02 Determine reliability and accuracy of sources.		
	29.03 Identify stated and unstated assumptions.		
	29.04 Recognizing logical inconsistencies and biases.		
31.0	Perform advanced study and technical skills related to aerospace technologies. – The student will be able to:		SC.912.N.1.1, 3, 4, 5, 6, 7; 3.3, 5; 4.2
	31.01 Identify an aerospace problem or product for improvement using the design methodology.		
	31.02 Develop a written plan of work for the design team to carry out the project.	LAFS.1112.W.1.2	
	31.03 Show evidence of technical study in support of the project.	LAFS.1112.W.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	31.04 Perform skills related to the aerospace project.	MAFS.912.S-IC.2.5,6 MAFS.912.N-VM.1.1, 2, 3, 4, 5; 2.4, 5 MAFS.912.G-CO.1.1, 2 MAFS.912.S-FC.1.6 MAFS.912.A-CED.1.4 MAFS.912.F-TF.1.3; 2.7, 5	
	31.05 Complete the project as planned.		
	31.06 Deliver a professional quality presentation of the design process and solution.	LAFS.1112.SL.2.4, 5, 6	
32.0	Demonstrate an understanding of career opportunities and requirements in the field of aerospace technologies. – The student will be able to:		
	32.01 Discuss individual interests related to a career in Aerospace Technologies.	LAFS.1112.SL.1.1	
	32.02 Explore career opportunities related to Aerospace Technologies.	LAFS.1112.W.3.7, 8	
	32.03 Explore secondary education opportunities related to Aerospace Technologies.	LAFS.1112.W.3.7, 8	
	32.04 Conduct a job search.		
	32.05 Complete a job application form correctly.	LAFS.1112.L.1.2; 2.3 LAFS.1112.W4.10	
	32.06 Demonstrate competence in job interview techniques.	LAFS.1112.SL.2.6	
	32.07 Create a professional resume and letter of introduction.		
	32.08 Solicit awards, letters of recommendation and recognition.		
	32.09 Organize work samples in a professional, presentable format.		