July 2000

Florida Department of Education
CURRICULUM FRAMEWORK

Program Title:	Aerospace Technology
Occupational Area:	Technology Education
Program Numbers:	8600080
CIP Number:	0821011800
Grade Level:	Secondary 9-12, & 30, 31
Standard Length:	3 Credits
Facility Design Code:	243, Related 808, 810, 849, 851, 852
CTSO:	Florida Technology Student Association (FL-TSA)
Certification:	INDUS ARTS @4 @6 I ART-TEC 1 @2

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

Listed below are the courses that make up this program.

8600580 - Aerospace Technology I
8600680 - Aerospace Technology II
8601780 - Aerospace Technology III

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

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

Advanced Applications in Technology (AAiT) - course number 8601900 is appropriate to be used for content area continuation in this program after all three credits of this program have been completed. The purpose of this course is to provide students with the opportunity to develop a school based project from "vision" to "reality". Working in teams to design, engineer, manufacture, construct, test, redesign, test again; and then produce a finished "project". This would involve using ALL the knowledge previously learned, not only in Technology Education but also across the curriculum. See the (AAiT) framework for more information.

Work-Based Experience (WBE) - course number 8601800 is the appropriate course to provide Technology Education students with the opportunity, as Student Learners, to gain real world

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

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

When a secondary student with a disability is enrolled in a vocational class with modifications to the curriculum framework, the particular outcomes and student performance standards which the student shall master to earn credit must be specified on an individual basis in each students Individual Educational Plan (IEP).

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

01.0 Demonstrate the ability to work safely with a variety of technologies.
02.0 Demonstrate interpersonal skills as they relate to the workplace.
03.0 Identify and apply methods of information acquisition and utilization.
04.0 Apply basic skills in communications, mathematics, and science appropriate to technological content and learning activities.
05.0 Demonstrate and apply design/problem-solving processes.
06.0 Express an understanding of technological systems and their complex interrelationships.
07.0 Demonstrate the ability to properly identify, organize, plan, and allocate resources.
08.0 Discuss individual interests and aptitudes as they relate to a career.
09.0 Demonstrate employability skills.
10.0 Demonstrate an understanding of entrepreneurship.
11.0 Make an informed and meaningful career choice.
12.0 Provide evidence of research into the history and development of aviation, unmanned space flight, manned space exploration, and the exploration and discovery of the universe.
13.0 Demonstrate an understanding of computer-assisted word processing, data-base and spread-sheet applications for research and development projects.
14.0 Demonstrate an understanding of power systems including; jet engines, internal combustion engines, rocket engines, solar cells, and nuclear power.
15.0 Demonstrate technical knowledge of CAD as it relates to producing plans for aerospace projects.
16.0 Demonstrate an application of CAM as it relates to manufacturing processes for aerospace technology projects.
17.0 Demonstrate a knowledge of robotics.

18.0 Demonstrate a knowledge of computer control technology.
19.0 Perform processing skills on materials and composites as they relate to aerospace technology.
20.0 Produce aerospace vehicles to demonstrate the principles of flight.
21.0 Describe the aerospace environment.
22.0 Explore the role of civilian spacecraft in the exploration and colonization of space.
23.0 Demonstrate technical knowledge of CAD as it relates to producing plans for aerospace projects.
24.0 Demonstrate an application of CAM as it relates to manufacturing processes for aerospace technology projects.
25.0 Demonstrate an understanding of electrical, mechanical, fluid, and pneumatic systems that could be used on/in space environments.
26.0 Demonstrate a knowledge of robotics.
27.0 Demonstrate a knowledge of computer control technology.
28.0 Perform processing skills on materials and composites as they relate to aerospace technology.
29.0 Develop test procedures for measuring and testing human performance in aerospace environments.
30.0 Produce aerospace vehicles to demonstrate the principles of flight.
31.0 Describe and demonstrate the principles of navigation.
32.0 Demonstrate appropriate skills in analyzing and evaluating technological advancements as reported by the media.
33.0 Demonstrate technical knowledge of CAD as it relates to producing plans for aerospace projects.
34.0 Demonstrate an application of CAM as it relates to manufacturing processes for aerospace technology projects.
35.0 Demonstrate an understanding of electrical, mechanical, fluid, and pneumatic systems that could be used on/in space environments.
36.0 Demonstrate a knowledge of robotics.
37.0 Demonstrate a knowledge of computer control technology.
38.0 Perform processing skills on materials and composites as they relate to aerospace technology.
39.0 Utilize test facilities and equipment to determine suitability of materials and processes in an aerospace.
40.0 Develop test procedures for measuring and testing human performance in aerospace environments.
41.0 Demonstrate an understanding of the effects of flight as it relates to biotechnology.
42.0 Conduct a research and experimentation project related to aerospace technology.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8600580
Course Title: Aerospace Technology I
Course Credit: 1

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

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

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

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

- 02.01 Perform roles in a student personnel system or in the Florida Technology Student Association (FL-TSA).
- 02.02 Participate as a member of a team.
- 02.03 Teach others new skills.
- 02.04 Identify skills needed to serve clients/customers.
- 02.05 Demonstrate leadership skills.
- 02.06 Describe strategies necessary for negotiating agreements.
- 02.07 Demonstrate the application of skills necessary to work with people of diverse backgrounds.
- 02.08 Form an understanding and appreciation for work after listening to or observing technology workers.
- 02.09 Form an understanding and appreciation for work after participating in a simulated technology group project in the laboratory.
- 02.10 Form an understanding and appreciation for the roles and work of co-workers.

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

- 03.01 Define terms related to computers.
- 03.02 Identify and describe methods of information acquisition and evaluation.

03.03 Discuss advantages and disadvantages in the application of technologies.
03.04 Produce a plan to organize and maintain information relevant to emerging technologies.
03.05 Comprehend and communicate information relevant to emerging technologies.
03.06 Demonstrate the use of computers to process information.

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

04.01 Identify and explain the main and subordinate ideas in a written work.
04.02 Distinguish different purposes and methods of writing, identify a writer's point of view and tone, and interpret a writer's meaning.
04.03 Define unfamiliar words by use of structural analysis, decoding, contextual clues, or by using a dictionary.
04.04 Distinguish fact from opinion.
04.05 Read critically by asking pertinent questions, by recognizing assumptions and implications, and by evaluating ideas.
04.06 Select, relate, and organize, ideas using outlining and/or graphic organizers and develop the ideas in coherent paragraphs.
04.07 Improve one's own writing by restructuring, correcting errors, and rewriting.
04.08 Gather and organize information from primary and secondary sources; write a report using this research; quote, paraphrase, and summarize accurately; and cite sources properly.
04.09 Vary one's writing style, including vocabulary and sentence structure, for different readers and purposes.
04.10 Write logical and understandable statements, or phrases, to accurately fill out commonly used forms.
04.11 Compose unified and coherent correspondence, directions, descriptions, explanations and reports.
04.12 Participate critically and constructively in the exchange of ideas, particularly during class discussions and conferences with instructors.
04.13 Conceive and develop ideas about a topic for the purpose of speaking to a group; choose and organize related ideas; present them clearly in Standard English; and evaluate similar presentations by others.
04.14 Use the mathematics of:
- integers, fractions, and decimals;
- ratios, proportions, and percentages;
- roots and powers;
- algebra;
- geometry.
04.15 Make estimates and approximations, and judge the reasonableness of a result.
04.16 Use elementary concepts of probability and statistics.
04.17 Draw, read, and analyze graphs, charts, and tables.
04.18 Ask appropriate scientific questions and recognize what is involved in experimental approaches to the solutions of such questions through familiarity with laboratory and field work.
04.19 Organize and communicate the results obtained by observation and experimentation.

04.20 Apply the basic principles of biology, physics, and chemistry (properties of matter; structure of compounds; concepts of motion; temperature, pressure and volume; work, power, force and energy; machines; human cell structure).
04.21 Identify problems rooted in basic biology, physics, or chemistry (effects of hazardous materials on health and safety, effects of drugs on health, trouble shooting problems on a machine).

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

05.01 Describe and explain steps in the design/problem-solving process.
05.02 Propose solutions to given problems.
05.03 Design and implement the optimal solution to a given problem.
05.04 Document each step of the design/problem-solving process.
05.05 Demonstrate "brainstorming" as a process to solve problems.
05.06 Define "critical thinking" and its value in the problem-solving process.

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

06.01 Demonstrate a knowledge of how social, organizational, and technological systems work.
06.02 Explore methods used to monitor and correct performance of technological systems.
06.03 Design and implement an optimal solution to a given problem.
06.04 Outline major historical technological developments or events.
06.05 Identify recent advances in technology.
06.06 Explain problem-solving roles of technology.
06.07 Forecast a technological development or event.
06.08 Define technology.

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

07.01 Demonstrate the ability to select goal-relevant activities, rank them, allocate time, and prepare and follow schedules.
07.02 Use or prepare budgets, make forecasts, keep records, and make adjustments to meet objectives.
07.03 Demonstrate the ability to acquire, store, allocate, and use materials or space efficiently.
07.04 Display a knowledge of the efficient use of human resources.

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

08.01 Describe individual strengths and weaknesses.
08.02 Discuss individual interests related to a career.
08.03 Identify careers within specific areas of technology.
08.04 Explore careers within specific areas of interest.

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

09.01 Conduct a job search.
09.02 Secure information about a career.
09.03 Identify documents which may be required when applying for a job interview.
09.04 Complete a job application form correctly.
09.05 Demonstrate competence in job interview techniques.
09.06 Prepare a resume for a job.

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

10.01 Define entrepreneurship.
10.02 Describe the importance of entrepreneurship to the American economy.
10.03 List the advantages and disadvantages of business ownership.
10.04 Identify the risks involved in ownership of a business.
10.05 Identify the necessary personal characteristics of a successful entrepreneur.
10.06 Identify the business skills needed to operate a small business efficiently and effectively.

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

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

12.0 PROVIDE EVIDENCE OF RESEARCH INTO THE HISTORY AND DEVELOPMENT OF AVIATION, UNMANNED SPACE FLIGHT, MANNED SPACE EXPLORATION, AND THE EXPLORATION AND DISCOVERY OF THE UNIVERSE--The student will be able to:

12.01 Define aerospace.
12.02 Describe early attempts at flight prior to the Wright Brothers flight in 1902.
12.03 Outline the early attempts at heavier than air powered flight prior to WWI.
12.04 Describe the affect of airpower on the outcome of world conflict.
12.05 Outline the beginnings of commercial aviation.
12.06 Identify the early research centers for aeronautics in the US.
12.07 Describe the role of aviation research and development.
12.08 Outline the development of space exploration
12.09 Describe the role of NACA and NASA in the development of aeronautics and space exploration.
12.10 Prepare a forecast of aerospace developments, and interplanetary space travel.

13.0 DEMONSTRATE AN UNDERSTANDING OF COMPUTER ASSISTED WORD PROCESSING, DATA BASE AND SPREAD SHEET APPLICATIONS FOR RESEARCH AND DEVELOPMENT PROJECTS--The student will be able to:

13.01 Demonstrate an ability to use a word processing program to prepare reports, outlines and descriptions of experiments, research and library projects related to aerospace technology.
13.02 Demonstrate an ability to use a computer based data base program to record, and communicate results from aerospace experiments.
13.03 Demonstrate an ability to use a spreadsheet application to record, compute and communicate mathematical and scientific data from an experimental aerospace activity.

14.0 DEMONSTRATE AN UNDERSTANDING OF POWER SYSTEMS INCLUDING, INTERNAL COMBUSTION ENGINES, JET ENGINES, ROCKET ENGINES, SOLAR CELLS AND NUCLEAR POWER USED IN AEROSPACE APPLICATIONS--The student will be able to:

14.01 Demonstrate an ability to assemble and operate a model reciprocating airplane engine.
14.02 Name the basic types of engines used for aircraft propulsion.
14.03 Describe the change from linear motion to rotary motion in a reciprocating engine.
14.04 Identify the elements of an aircraft engine/fuel systems.
14.05 Describe the operation of aircraft turbine and ramjet engines.
14.06 Explain the application of Newton’s laws to rocketry.
14.07 Diagram a rocket system including the airframe, propulsion, guidance and control.
14.08 Explain chemical propulsion systems.
14.09 Explain advanced propulsion systems including heavy lift launch systems, electrical propulsion, and nuclear propulsion.
14.10 Describe the use and operation solar cells to generate electrical power.
14.11 Perform experimental testing, including designing test devices to determine the power (thrust) of a model rocket engine.

15.0 DEMONSTRATE TECHNICAL KNOWLEDGE OF CAD AS IT IS RELATED TO PRODUCING PLANS FOR AEROSPACE PROJECTS--The student will be able to:

15.01 Demonstrate the application of a computer and software program to develop a plan for an aerospace vehicle.
15.02 Demonstrate problem solving skills relative to computer aided drafting utilizing the techniques learned in this course.

16.0 DEMONSTRATE AN APPLICATION OF CAM AS IT RELATES TO MANUFACTURING PROCESSES FOR AEROSPACE TECHNOLOGY PROJECTS--The student will be able to:

16.01 Demonstrate an ability to perform a milling, engraving or turning operation utilizing a computer assisted manufacturing program.
16.02 Demonstrate problem solving skills relative to computer assisted manufacturing utilizing the techniques learned in this course.

17.0 DEMONSTRATE A KNOWLEDGE OF ROBOTICS--The student will be able to:

17.01 Identify three types of robots.
17.02 State the function of effectors, sensors, controllers, and auxiliary parts in robotics system.
17.03 Program a robot using computer to perform a specific task using machine language.
17.04 Explain how robotics technology is used in the space program.
17.05 Demonstrate problem solving skills using robotics technology as it applies to aerospace technology experiments and programs.
17.06 Forecast how robotics technology will be used in the exploration of space, space colonization or interplanetary space travel.

18.0 DEMONSTRATE A KNOWLEDGE OF COMPUTER CONTROL TECHNOLOGY--The student will be able to:

18.01 Write programs in Logo Computer Language.
18.02 Demonstrate an ability to develop programs to control simple machines using Logo programming language.

19.0 PERFORM PROCESSING SKILLS ON MATERIALS AND COMPOSITES AS THEY RELATE TO AEROSPACE TECHNOLOGY--The student will be able to:

19.01 Identify tools, machines and equipment in the laboratory and explain their functions.
19.02 Select appropriate tools, machines and equipment to accomplish a given task.
19.03 Demonstrate safe and correct use of tools, machines and equipment.
19.04 Identify various industrial raw materials.
19.05 Identify and explain the composition of composite materials.
19.06 Perform processing skills on materials and composites as needed to develop aerospace vehicles, models experimental fixtures and apparatus.

20.0 PRODUCE AEROSPACE VEHICLES TO DEMONSTRATE THE PRINCIPLES OF FLIGHT--The student will be able to:

20.01 Identify the structural components of aircraft.
20.02 Construct flying models of lighter than air craft.
20.03 Construct flying models of kites to demonstrate the properties of lift.
20.04 Construct flying models of a glider to specific design specifications.
20.05 Construct flying models of a powered aircraft, using control surfaces to control flight characteristics of pitch, yaw and roll.
20.06 Construct a flying model of a research aircraft of ones own design.
20.07 Construct a flying model of an aircraft to demonstrate the use of radio control technology.
20.08 Design and build a model single stage rocket.
20.09 Construct a model rocket designed to carry a specific payload.
20.10 Construct a model rocket that utilizes multi staging.
20.11 Construct a model rocket launch control system.
20.12 Design and build an alternate recovery system for recovery of a rocket payload.

20.13 Design, build and test a boost glider model rocket system.
20.14 Plan, organize, and control a model rocketry contest.

21.0 DESCRIBE THE AEROSPACE ENVIRONMENT--The student will be able to:

21.01 Identify atmospheric regions and elements.
21.02 Describe the roles of water and particulate matter in the atmosphere.
21.03 Describe and identify the elements of the atmosphere in motion. Define weather.
21.04 Explain the role weather forecasting has as it related to aerospace technology.
21.05 Demonstrate an understanding of the principle bodies of the universe.
21.06 Utilize astronomical principles, and technology to study the solar systems.
21.07 Develop a radio telemetry system to measure temperature, pressure, humidity, or acceleration during a rocket flight.
21.08 Define interplanetary space.
21.09 Describe the physical properties of interplanetary space including the structure of the sun, its formation and future, magnetosphere and solar winds, radiation belts, cislunar space and meteoroids.
21.10 Describe interstellar and intragalactic space.

22.0 EXPLORE THE ROLE OF CIVILIAN SPACECRAFT IN THE EXPLORATION AND COLONIZATION OF SPACE--The student will be able to:

22.01 Participate in the development of a study for a model of manned interplanetary space travel.
22.02 Develop a plan for scientific research to be performed on a space station facility.
22.03 Develop a plan for flight crew training for a manned space flight.
22.04 Research, develop, plan, and build model structures of space colonization structures.
22.05 Develop plans, models and a visual presentation of a manned space flight to a distant planet in the solar system.
22.06 Examine methods of sending and receiving messages and controlling telemetry from space.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8600680
Course Title: Aerospace Technology II
Course Credit: 1

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

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

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

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

- 02.01 Perform roles in a student personnel system or in the Florida Technology Student Association (FL-TSA).
- 02.02 Participate as a member of a team.
- 02.03 Teach others new skills.
- 02.04 Identify skills needed to serve clients/customers.
- 02.05 Demonstrate leadership skills.
- 02.06 Describe strategies necessary for negotiating agreements.
- 02.07 Demonstrate the application of skills necessary to work with people of diverse backgrounds.
- 02.08 Form an understanding and appreciation for work after listening to or observing technology workers.
- 02.09 Form an understanding and appreciation for work after participating in a simulated technology group project in the laboratory.
- 02.10 Form an understanding and appreciation for the roles and work of co-workers.

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

- 03.01 Define terms related to computers.
- 03.02 Identify and describe methods of information acquisition and evaluation.

03.03 Discuss advantages and disadvantages in the application of technologies.
03.04 Produce a plan to organize and maintain information relevant to emerging technologies.
03.05 Comprehend and communicate information relevant to emerging technologies.
03.06 Demonstrate the use of computers to process information.

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

04.01 Identify and explain the main and subordinate ideas in a written work.
04.02 Distinguish different purposes and methods of writing, identify a writer's point of view and tone, and interpret a writer's meaning.
04.03 Define unfamiliar words by use of structural analysis, decoding, contextual clues, or by using a dictionary.
04.04 Distinguish fact from opinion.
04.05 Read critically by asking pertinent questions, by recognizing assumptions and implications, and by evaluating ideas.
04.06 Select, relate, and organize, ideas using outlining and/or graphic organizers and develop the ideas in coherent paragraphs.
04.07 Improve one's own writing by restructuring, correcting errors, and rewriting.
04.08 Gather and organize information from primary and secondary sources; write a report using this research; quote, paraphrase, and summarize accurately; and cite sources properly.
04.09 Vary one's writing style, including vocabulary and sentence structure, for different readers and purposes.
04.10 Write logical and understandable statements, or phrases, to accurately fill out commonly used forms.
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04.12 Participate critically and constructively in the exchange of ideas, particularly during class discussions and conferences with instructors.
04.13 Conceive and develop ideas about a topic for the purpose of speaking to a group; choose and organize related ideas; present them clearly in Standard English; and evaluate similar presentations by others.
04.14 Use the mathematics of:
- integers, fractions, and decimals;
- ratios, proportions, and percentages;
- roots and powers;
- algebra;
- geometry.
04.15 Make estimates and approximations, and judge the reasonableness of a result.
04.16 Use elementary concepts of probability and statistics.
04.17 Draw, read, and analyze graphs, charts, and tables.
04.18 Ask appropriate scientific questions and recognize what is involved in experimental approaches to the solutions of such questions through familiarity with laboratory and field work.
04.19 Organize and communicate the results obtained by observation and experimentation.

04.20 Apply the basic principles of biology, physics, and chemistry (properties of matter; structure of compounds; concepts of motion; temperature, pressure and volume; work, power, force and energy; machines; human cell structure).
04.21 Identify problems rooted in basic biology, physics, or chemistry (effects of hazardous materials on health and safety, effects of drugs on health, trouble shooting problems on a machine).

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

05.01 Describe and explain steps in the design/problem-solving process.
05.02 Propose solutions to given problems.
05.03 Design and implement the optimal solution to a given problem.
05.04 Document each step of the design/problem-solving process.
05.05 Demonstrate "brainstorming" as a process to solve problems.
05.06 Define "critical thinking" and its value in the problem-solving process.

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

06.01 Demonstrate a knowledge of how social, organizational, and technological systems work.
06.02 Explore methods used to monitor and correct performance of technological systems.
06.03 Design and implement an optimal solution to a given problem.
06.04 Outline major historical technological developments or events.
06.05 Identify recent advances in technology.
06.06 Explain problem-solving roles of technology.
06.07 Forecast a technological development or event.
06.08 Define technology.

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

07.01 Demonstrate the ability to select goal-relevant activities, rank them, allocate time, and prepare and follow schedules.
07.02 Use or prepare budgets, make forecasts, keep records, and make adjustments to meet objectives.
07.03 Demonstrate the ability to acquire, store, allocate, and use materials or space efficiently.
07.04 Display a knowledge of the efficient use of human resources.

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

08.01 Describe individual strengths and weaknesses.
08.02 Discuss individual interests related to a career.
08.03 Identify careers within specific areas of technology.
08.04 Explore careers within specific areas of interest.

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

09.01 Conduct a job search.
09.02 Secure information about a career.
09.03 Identify documents which may be required when applying for a job interview.
09.04 Complete a job application form correctly.
09.05 Demonstrate competence in job interview techniques.
09.06 Prepare a resume for a job.

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

10.01 Define entrepreneurship.
10.02 Describe the importance of entrepreneurship to the American economy.
10.03 List the advantages and disadvantages of business ownership.
10.04 Identify the risks involved in ownership of a business.
10.05 Identify the necessary personal characteristics of a successful entrepreneur.
10.06 Identify the business skills needed to operate a small business efficiently and effectively.

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

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

23.0 DEMONSTRATE TECHNICAL KNOWLEDGE OF CAD AS IT IS RELATED TO PRODUCING PLANS FOR AEROSPACE PROJECTS--The student will be able to:

23.01 Demonstrate the application of a computer and software program to develop a plan for an aerospace vehicle.
23.02 Demonstrate problem solving skills relative to computer aided drafting utilizing the techniques learned in this course.

24.0 DEMONSTRATE AN APPLICATION OF CAM AS IT RELATES TO MANUFACTURING PROCESSES FOR AEROSPACE TECHNOLOGY PROJECTS--The student will be able to:

24.01 Demonstrate an ability to perform a milling, engraving or turning operation utilizing a computer assisted manufacturing program.
24.02 Demonstrate problem solving skills relative to computer assisted manufacturing utilizing the techniques learned in this course.

25.0 DEMONSTRATE A BASIC UNDERSTANDING OF ELECTRICAL, MECHANICAL, FLUID AND PNEUMATIC SYSTEMS THAT COULD BE USED ON/IN AEROSPACE ENVIRONMENTS--The student will be able to:

25.01 Demonstrate the concepts of force, work, rate, resistance, energy and power through the use of various

mechanical sub systems to include: gears, belts, valves, chains, pulleys, screws, cams, linkages, rods, and sprockets or mechanical trainers.

25.02 Demonstrate the concepts of force, work rate, resistance, and power through the use of various fluid subsystems to include: fluid manometers, hydraulic lifts, pipes, valves, tanks, air gauges of hydraulic trainers, and pneumatic trainers.

25.03 Demonstrate the concepts of force, work, rate, resistance, energy, and power through the use of various electrical sub systems to include: conductors, control elements, electrical loads, voltage sources, current sources, circuits, components, and measurement equipment, or electrical/electronic trainers.

25.04 Demonstrate problem solving skills relative to electrical, mechanical or fluid systems related to aerospace technology experiments.

26.0 DEMONSTRATE A KNOWLEDGE OF ROBOTICS--The student will be able to:

26.01 Identify three types of robots.

26.02 State the function of effectors, sensors, controllers, and auxiliary parts in robotics system.

26.03 Program a robot using computer to perform a specific task using machine language.

26.04 Explain how robotics technology is used in the space program.

26.05 Demonstrate problem solving skills using robotics technology as it applies to aerospace technology experiments and programs.

26.06 Forecast how robotics technology will be used in the exploration of space, space colonization or interplanetary space travel.

27.0 DEMONSTRATE A KNOWLEDGE OF COMPUTER CONTROL TECHNOLOGY--The student will be able to:

27.01 Write programs in Logo Computer Language.

27.02 Demonstrate an ability to develop programs to control simple machines using Logo programming language.

28.0 PERFORM PROCESSING SKILLS ON MATERIALS AND COMPOSITES AS THEY RELATE TO AEROSPACE TECHNOLOGY--The student will be able to:

28.01 Identify tools, machines and equipment in the laboratory and explain their functions.

28.02 Select appropriate tools, machines and equipment to accomplish a given task.

28.03 Demonstrate safe and correct use of tools, machines and equipment.

28.04 Identify various industrial raw materials.

28.05 Identify and explain the composition of composite materials.

28.06 Perform processing skills on materials and composites as needed to develop aerospace vehicles, models experimental fixtures and apparatus.

29.0 DEVELOP TEST PROCEDURES FOR MEASURING AND TESTING HUMAN PERFORMANCE IN AEROSPACE ENVIRONMENTS--The student will be able to:

29.01 Construct human data charts to determine the variation in body dimensions of human subjects.
29.02 Evaluate products and fixtures used in aerospace environments and assess their suitability for human use.
29.03 Construct human manikins for use in determining human size as related to aerospace environments.
29.04 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.
29.05 Demonstrate an ability to control an aircraft in flight by using a computer flight simulator.
29.06 Demonstrate an ability to control an aircraft in flight using a radio control system.

30.0 PRODUCE AEROSPACE VEHICLES TO DEMONSTRATE THE PRINCIPLES OF FLIGHT--The student will be able to:

30.01 Identify the structural components of aircraft.
30.02 Construct flying models of lighter than air craft.
30.03 Construct flying models of kites to demonstrate the properties of lift.
30.04 Construct flying models of a glider to specific design specifications.
30.05 Construct flying models of a powered aircraft, using control surfaces to control flight characteristics of pitch, yaw and roll.
30.06 Construct a flying model of a research aircraft of ones own design.
30.07 Construct a flying model of an aircraft to demonstrate the use of radio control technology.
30.08 Design and build a model single stage rocket.
30.09 Construct a model rocket designed to carry a specific payload.
30.10 Construct a model rocket that utilizes multi staging.
30.11 Construct a model rocket launch control system.
30.12 Design and build an alternate recovery system for recovery of a rocket payload.
30.13 Design, build and test a boost glider model rocket system.
30.14 Plan, organize, and control a model rocketry contest.

31.0 DESCRIBE AND DEMONSTRATE PRINCIPLES OF NAVIGATION--The student will be able to:

31.01 Be able to describe navigation principles as they relate to aeronautical travel.
31.02 Demonstrate and ability to read and use an aeronautical navigational chart.
31.03 Examine navigational technologies and systems as they relate to aeronautical systems.
31.04 Complete a flight plan for a fixed wing aircraft, from destination to destination.
31.05 Demonstrate an understanding and application of mathematical applications as they relate to determining space flight mechanics.
31.06 Demonstrate an ability to compute a space flight orbit.
31.07 Define geostationary, polar and sunsynchronous orbits.

32.0 DEMONSTRATE APPROPRIATE SKILLS IN ANALYZING AND EVALUATING TECHNOLOGICAL ADVANCEMENTS AS REPORTED BY THE MEDIA--The student will be able to:

32.01 Distinguish between verifying facts and claims.
32.02 Determine reliability sources.
32.03 Determine accuracy of source.
32.04 Detecting bias.
32.05 Identify stated and unstated assumptions.
32.06 Recognizing logical inconsistencies.

July 2000

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8601780
Course Title: Aerospace Technology III
Course Credit: 1

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

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

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

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

- 02.01 Perform roles in a student personnel system or in the Florida Technology Student Association (FL-TSA).
- 02.02 Participate as a member of a team.
- 02.03 Teach others new skills.
- 02.04 Identify skills needed to serve clients/customers.
- 02.05 Demonstrate leadership skills.
- 02.06 Describe strategies necessary for negotiating agreements.
- 02.07 Demonstrate the application of skills necessary to work with people of diverse backgrounds.
- 02.08 Form an understanding and appreciation for work after listening to or observing technology workers.
- 02.09 Form an understanding and appreciation for work after participating in a simulated technology group project in the laboratory.
- 02.10 Form an understanding and appreciation for the roles and work of co-workers.

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

- 03.01 Define terms related to computers.
- 03.02 Identify and describe methods of information acquisition and evaluation.

03.03 Discuss advantages and disadvantages in the application of technologies.
03.04 Produce a plan to organize and maintain information relevant to emerging technologies.
03.05 Comprehend and communicate information relevant to emerging technologies.
03.06 Demonstrate the use of computers to process information.

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

04.01 Identify and explain the main and subordinate ideas in a written work.
04.02 Distinguish different purposes and methods of writing, identify a writer's point of view and tone, and interpret a writer's meaning.
04.03 Define unfamiliar words by use of structural analysis, decoding, contextual clues, or by using a dictionary.
04.04 Distinguish fact from opinion.
04.05 Read critically by asking pertinent questions, by recognizing assumptions and implications, and by evaluating ideas.
04.06 Select, relate, and organize, ideas using outlining and/or graphic organizers and develop the ideas in coherent paragraphs.
04.07 Improve one's own writing by restructuring, correcting errors, and rewriting.
04.08 Gather and organize information from primary and secondary sources; write a report using this research; quote, paraphrase, and summarize accurately; and cite sources properly.
04.09 Vary one's writing style, including vocabulary and sentence structure, for different readers and purposes.
04.10 Write logical and understandable statements, or phrases, to accurately fill out commonly used forms.
04.11 Compose unified and coherent correspondence, directions, descriptions, explanations and reports.
04.12 Participate critically and constructively in the exchange of ideas, particularly during class discussions and conferences with instructors.
04.13 Conceive and develop ideas about a topic for the purpose of speaking to a group; choose and organize related ideas; present them clearly in Standard English; and evaluate similar presentations by others.
04.14 Use the mathematics of:
- integers, fractions, and decimals;
- ratios, proportions, and percentages;
- roots and powers;
- algebra;
- geometry.
04.15 Make estimates and approximations, and judge the reasonableness of a result.
04.16 Use elementary concepts of probability and statistics.
04.17 Draw, read, and analyze graphs, charts, and tables.
04.18 Ask appropriate scientific questions and recognize what is involved in experimental approaches to the solutions of such questions through familiarity with laboratory and field work.
04.19 Organize and communicate the results obtained by observation and experimentation.

04.20 Apply the basic principles of biology, physics, and chemistry (properties of matter; structure of compounds; concepts of motion; temperature, pressure and volume; work, power, force and energy; machines; human cell structure).
04.21 Identify problems rooted in basic biology, physics, or chemistry (effects of hazardous materials on health and safety, effects of drugs on health, trouble shooting problems on a machine).

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

05.01 Describe and explain steps in the design/problem-solving process.
05.02 Propose solutions to given problems.
05.03 Design and implement the optimal solution to a given problem.
05.04 Document each step of the design/problem-solving process.
05.05 Demonstrate "brainstorming" as a process to solve problems.
05.06 Define "critical thinking" and its value in the problem-solving process.

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

06.01 Demonstrate a knowledge of how social, organizational, and technological systems work.
06.02 Explore methods used to monitor and correct performance of technological systems.
06.03 Design and implement an optimal solution to a given problem.
06.04 Outline major historical technological developments or events.
06.05 Identify recent advances in technology.
06.06 Explain problem-solving roles of technology.
06.07 Forecast a technological development or event.
06.08 Define technology.

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

07.01 Demonstrate the ability to select goal-relevant activities, rank them, allocate time, and prepare and follow schedules.
07.02 Use or prepare budgets, make forecasts, keep records, and make adjustments to meet objectives.
07.03 Demonstrate the ability to acquire, store, allocate, and use materials or space efficiently.
07.04 Display a knowledge of the efficient use of human resources.

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

08.01 Describe individual strengths and weaknesses.
08.02 Discuss individual interests related to a career.
08.03 Identify careers within specific areas of technology.
08.04 Explore careers within specific areas of interest.

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

09.01 Conduct a job search.
09.02 Secure information about a career.
09.03 Identify documents which may be required when applying for a job interview.
09.04 Complete a job application form correctly.
09.05 Demonstrate competence in job interview techniques.
09.06 Prepare a resume for a job.

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

10.01 Define entrepreneurship.
10.02 Describe the importance of entrepreneurship to the American economy.
10.03 List the advantages and disadvantages of business ownership.
10.04 Identify the risks involved in ownership of a business.
10.05 Identify the necessary personal characteristics of a successful entrepreneur.
10.06 Identify the business skills needed to operate a small business efficiently and effectively.

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

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

33.0 DEMONSTRATE TECHNICAL KNOWLEDGE OF CAD AS IT IS RELATED TO PRODUCING PLANS FOR AEROSPACE PROJECTS--The student will be able to:

33.01 Demonstrate the application of a computer and software program to develop a plan for an aerospace vehicle.
33.02 Demonstrate problem solving skills relative to computer aided drafting utilizing the techniques learned in this course.

34.0 DEMONSTRATE AN APPLICATION OF CAM AS IT RELATES TO MANUFACTURING PROCESSES FOR AEROSPACE TECHNOLOGY PROJECTS--The student will be able to:

34.01 Demonstrate an ability to perform a milling, engraving or turning operation utilizing a computer assisted manufacturing program.
34.02 Demonstrate problem solving skills relative to computer assisted manufacturing utilizing the techniques learned in this course.

35.0 DEMONSTRATE A BASIC UNDERSTANDING OF ELECTRICAL, MECHANICAL, FLUID AND PNEUMATIC SYSTEMS THAT COULD BE USED ON/IN AEROSPACE ENVIRONMENTS--The student will be able to:

35.01 Demonstrate the concepts of force, work, rate, resistance, energy and power through the use of various

mechanical sub systems to include: gears, belts, valves, chains, pulleys, screws, cams, linkages, rods, and sprockets or mechanical trainers.

35.02 Demonstrate the concepts of force, work rate, resistance, and power through the use of various fluid subsystems to include: fluid manometers, hydraulic lifts, pipes, valves, tanks, air gauges of hydraulic trainers, and pneumatic trainers.

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38.05 Identify and explain the composition of composite materials.

38.06 Perform processing skills on materials and composites as needed to develop aerospace vehicles, models experimental fixtures and apparatus.

39.0 UTILIZE TEST FACILITIES AND EQUIPMENT TO DETERMINE SUITABILITY OF MATERIALS AND PROCESSES TO AN AEROSPACE ENVIRONMENT--The student will be able to:

39.01 Use appropriate test instruments, equipment and machines to test materials and processes for strength, compressibility, heat retention, insulating properties, conductivity or other properties as necessary to the solution of aerospace design and engineering problems.
39.02 Use test apparatus to conduct testing of processes, procedures and equipment developed in design and engineering problems.
39.03 Demonstrate problem solving using test equipment, machines and instruments to determine suitability of materials and processes developed in research and development activities of aerospace engineering problems.
39.04 Explain the requirements of the aerospace industry for quality control and testing of materials and processes as it relates to product development, safety and performance of aerospace products, and vehicles.

40.0 DEVELOP TEST PROCEDURES FOR MEASURING AND TESTING HUMAN PERFORMANCE IN AEROSPACE ENVIRONMENTS--The student will be able to:

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40.04 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.
40.05 Demonstrate an ability to control an aircraft in flight by using a computer flight simulator.
40.06 Demonstrate an ability to control an aircraft in flight using a radio control system.

41.0 DEMONSTRATE AN UNDERSTANDING OF THE EFFECTS OF FLIGHT AS IT RELATES TO BIOTECHNOLOGY--The student will be able to:

41.01 Demonstrate the effects of living in space on plant and animal organisms.
41.02 Plan and build model space craft to demonstrate possible solutions to space travel, extended space living quarters, and providing a living space environment for human exploration of the universe.
41.03 Plan and produce a model system for providing life support systems for space travel.
41.04 Research the biological effects of extended space flight.
41.05 Participate in a space flight simulation.

42.0 CONDUCT A RESEARCH AND EXPERIMENTATION PROJECT RELATED TO AEROSPACE TECHNOLOGY--The student will be able to:

42.01 Identify a problem.
42.02 State a need to research the problem.
42.03 Form a hypothesis about the problem.
42.04 Plan the procedures for researching the problem.
42.05 Conduct the research following the planned procedures.
42.06 Present the research findings in a seminar.

42.07 State conclusions based on the research findings.