July 2008

Florida Department of Education
Division of Community Colleges
CURRICULUM FRAMEWORK

Program Title:	AEROSPACE TECHNOLOGY
Occupational Area:	Industrial Education
Career Cluster:	Manufacturing
	PSV
CIP Number:	0615.080100 A.A.S.
	1615.080100 A. S.
Grade level:	College Credit
Length:	70 Credit Hours

I. **MAJOR CONCEPTS/CONTENT:** The purpose of this program is to prepare students for employment as aerospace technicians that assemble, service, test, operate and repair systems associated with both expendable and reusable space launch vehicles, payloads, related laboratories and ground support equipment. This program also provides supplemental training for persons previously or currently employed in this occupation. Instruction is designed to qualify students for examinations for certification as an aerospace technician in various skill areas.

Since 70 credit hours, including hands on experience, are required in this curriculum, two summer terms will probably be required to complete the program within two years.

II. **LABORATORY ACTIVITIES:** Shop or laboratory activities are an integral and important part of this program. The Aerospace Industry representatives in a formal DACUM determined the laboratory equipment and skill levels required. Course activities will provide hands-on instruction in the use of tools, equipment, materials and current practices and processes found in the industry. Significant capital investments in facilities and equipment may be required in this program. All tools and shop equipment should be maintained in good working order and in a condition for safe operation.

TOOLS AND EQUIPMENT

1. Specialized electronic tools
2. Hand tools
3. Electrical test equipment
4. Precision measuring equipment
5. Pressure gauges
6. Mass spectrometer
7. Torque wrenches
8. Pneumatic tools
9. Power tools
10. Drill press
11. Band Saw
12. Benders
13. Flow meters
14. Brake
15. Shears.
16. Optical comparator

17. Tubing
18. Taps, dies
19. Flares
20. Swaging

III. SPECIAL NOTES:

1. To be transferable statewide between institutions, this program/course must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific program or course articulation agreements with each other.
2. Required certification examinations include written, oral and practical. The only way a person can get authorization to take these examinations is to (1) graduate from an approved aerospace technician course or (2) obtain permission to take the test based on current industry experience.
3. Cooperative work experience - On-the-Job-Training (OJT) is appropriate for this program. Whenever cooperative training - OJT is offered, the following are required for each student: a training plan, signed by the student, teacher, and employer, which includes instructional objectives and a list of on-the-job and in-school learning experiences; a workstation that reflects equipment, skills and tasks that are relevant to the occupation which the student has chosen as a career goal. The student will usually receive compensation for work performed.

   SCANS Competencies: To accomplish the Secretary's Commission on Achieving Necessary Skills (SCANS) competencies, instructional strategies for this cluster must include methods that require students to identify, organize, and use resources appropriately; to work with each other cooperatively and productively; to acquire and use information; to understand social, organizational, and technological systems; and to work with a variety of tools and equipment. Instructional strategies must also incorporate methods of improving students' personal qualities and higher-order thinking skills.

   Community colleges initiating this program are strongly encouraged to visit existing Florida schools with two or four-year curriculums in this area.

4. The Aerospace Industry has very strict employment rules on drug use, citizenship status and criminal record that are additional work requirements students must meet for internships and employment. Students should be aware of these industry requirements prior to registration in the program.

IV. INSTRUCTOR QUALIFICATIONS

Specialty Instructor Qualifications: Instructors teaching subjects that have certifications in the subject areas should be so certified and have recent actual experience in the subject area. Instructors teaching related courses in the Aerospace Technician curriculum should have both academic training and recent actual experience.

Academic Instructor Qualifications: A Masters Degree in the subject area is preferred. A Bachelor Degree with eighteen hours of course work in the subject area is a minimum.

V. **INTENDED OUTCOMES:** After successfully completing the course, the student will be able to:

01.0 Demonstrate appropriate communications skills.
02.0 Demonstrate appropriate math skills.
03.0 Demonstrate appropriate understanding of basic science.
04.0 Demonstrate understanding of safe, efficient, professional work practices.
05.0 Demonstrate the knowledge, testing and repair of spacecraft systems.
06.0 Demonstrate the use and maintenance of industry tools.
07.0 Perform basic electricity, electronic and fiber optics skills.
08.0 Demonstrate an understanding of appropriate safety/OSHA rules and regulations.
09.0 Demonstrate the ability to fabricate component parts to specifications.
11.0 Prepare, analyze and evaluate technical reports and data.
11.0 Demonstrate the ability to evaluate problems, troubleshoot and implement appropriate corrective action.
12.0 Select, configure, calibrate, operate and evaluate precision, non-destructive test equipment.
13.0 Demonstrate appropriate knowledge of the operation and repair of high pressure hydraulic and pneumatic systems.
14.0 Demonstrate employability skills.
15.0 Successfully complete internship.

July 2008

Florida Department of Education
Division of Community Colleges
STUDENT PERFORMANCE STANDARDS

Program Title: AEROSPACE TECHNOLOGY
Postsecondary number: 0615.080100 A.A.S.
1615.080100 A.S.

01.0 **DEMONSTRATE APPROPRIATE COMMUNICATIONS SKILLS** - The student will be able to:

- 01.01 Write logical and understandable statements, or phrases, to complete with accuracy the forms/invoices commonly used in business and industry.
- 01.02 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
- 01.03 Read and follow written and oral instructions.
- 01.04 Answer and ask questions coherently and concisely.
- 01.05 Read critically by recognizing assumptions and implications and by evaluating ideas.
- 01.06 Demonstrate appropriate telephone/communication skills

02.0 **DEMONSTRATE APPROPRIATE MATH SKILLS** - The student will be able to:

- 02.01 Work with the common sets of real numbers in performing the four basic operations.
- 02.02 Use the four basic operations in working with polynomial expressions.
- 02.03 Solve linear equations in one variable and applied problems.
- 02.04 Solve linear inequalities in one variable and applied problems.
- 02.05 Factor polynomials.
- 02.06 Simplify algebraic fractions, complex fractions and solve rational and literal equations and applied problems.
- 02.07 Extract roots and raise numbers to a given power.
- 02.08 Determine areas and volumes of various geometrical shapes.
- 02.09 Solve ratio, proportion, and percentage problems.
- 02.10 Perform algebraic operations involving addition, subtraction, multiplication, and division of positive and negative numbers.
- 02.11 Graph linear equations and inequalities in two variables and solve graph systems of linear equations and inequalities in two variables.
- 02.12 Solve and graph quadratic equations and inequalities with real solutions and solve related word problems.
- 02.13 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.

02.14 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
02.15 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
02.16 Determine the correct purchase price, to include sales tax, for a materials list containing a minimum of six items.
02.17 Demonstrate an understanding of federal, state and local taxes and their computation.

03.0 **DEMONSTRATE APPROPRIATE UNDERSTANDING OF BASIC SCIENCE** - The student will be able to:

03.01 Identify and characterize materials and commodities used in the aerospace industry.
03.02 Demonstrate a basic knowledge of metallurgy.
03.03 Identify uses and hazards involved in handling common materials and commodities used in the aerospace industry.
03.04 Identify materials compatibility/incompatibility.
03.05 Demonstrate a knowledge of chemical processes involved in metal treatments.
03.06 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
03.07 Draw conclusions or make inferences from data.
03.08 Identify health-related problems, which may result from exposure to work related chemicals and hazardous materials, and know the proper precautions required for handling such materials.
03.09 Understand pressure measurement in terms of P.S.I., inches of mercury, and K.P.A.
03.10 Recognize type and degree of corrosion.
03.11 Identify various types of contamination.
03.12 Identify symptoms and causes of metal fatigue.
03.13 Identify a good/bad weld.
03.14 Identify symptoms/causes of delamination.
03.15 Identify symptoms/causes of faulty bonds.
03.16 Demonstrate knowledge of spacecraft fuels and oxidizers.
03.17 Demonstrate knowledge of characteristics and handling of cryogenics.
03.18 Demonstrate knowledge of characteristics and handling of hypergolics.
03.19 Identify appropriate emergency procedures.

04.0 **DEMONSTRATE UNDERSTANDING OF SAFE EFFICIENT PROFESSIONAL WORK PRACTICES** - The student will be able to:

04.01 Observe work area rules and regulations.
04.02 Tether tools and personal items.
04.03 Log tools (ingress/egress).
04.04 Follow clean room/controlled environment procedures.
04.05 Conduct pre-shift/post-shift tool, materials, equipment, and supplies inventory.

04.06 Follow proper foreign object debris (FOD) procedures.
04.07 Inspect for foreign object debris (FOD).
04.08 Demonstrate good housekeeping practices.
04.09 Demonstrate knowledge of static electricity hazards.
04.10 Demonstrate professional work ethics.
04.11 Demonstrate knowledge of ISO 9000.
04.12 Demonstrate knowledge of quality assurance sciences.
04.13 Demonstrate knowledge of computer applications in quality programs.

05.0 **DEMONSTRATE THE KNOWLEDGE, TESTING AND REPAIR OF SPACECRAFT SYSTEMS** - The student will be able to:

05.01 Identify spacecraft systems and sub systems and how they relate to the entire spacecraft.
05.02 Demonstrate understanding of the operation of spacecraft systems.
05.03 Identify operational differences between expendable and reusable spacecraft.
05.04 Demonstrate knowledge of basic principles of hydraulics/pneumatics.
05.05 Demonstrate knowledge of basic principles of pyrotechnic devices.
05.06 Demonstrate knowledge of basic principles of rocket propulsion.
05.07 Demonstrate knowledge of basic principles of electro-mechanical systems.
05.08 Demonstrate basic knowledge of ground support equipment.
05.09 Assemble/disassemble components from various systems.
05.10 Demonstrate basic knowledge of how to modify or rework major systems and components to close tolerances.
05.11 Perform fit check/functional test.
05.12 Operate ground support equipment (GSE).
05.13 Operate switches, circuit breakers and valves.
05.14 Demonstrate a knowledge of thermal barriers.

06.0 **DEMONSTRATE THE USE AND MAINTENANCE OF INDUSTRY TOOLS** - The student will be able to:

06.01 Identify proper tools.
06.02 Inspect tools for cleanliness.
06.03 Inspect tools for functionality.
06.04 Clean/decontaminate tools/equipment.
06.05 Demonstrate knowledge/use of hydrasets

07.0 **PERFORM BASIC ELECTRICITY, ELECTRONIC AND FIBER OPTICS SKILLS** - The student will be able to:

07.01 Measure capacitance and inductance.
07.02 Calculate and measure electrical power.
07.03 Measure voltage, current, resistance, continuity, and leakage.
07.04 Determine the relationship of voltage, current, and resistance in electrical circuits

07.05 Read and interpret electrical circuit diagrams.
07.06 Inspect and service batteries.
07.07 Utilize proper electrical safety procedures.
07.08 Demonstrate basic knowledge of wire wrapping, potting, crimping, cable lacing and repair.
07.09 Demonstrate basic soldering skills and the identification of components common to electronics.
07.10 Troubleshoot electrical systems.
07.11 Demonstrate knowledge of safety procedures when handling fiber optics.
07.12 Demonstrate knowledge of different types of fiber optic materials and their characteristics.
07.13 Make terminations, splices, and connections.
07.14 Test fiber optic systems using various test equipment.
07.15 Perform fiber optic troubleshooting and diagnosis.

08.0 **DEMONSTRATE AN UNDERSTANDING OF APPROPRIATE SAFETY/OSHA RULES AND REGULATIONS** - The student will be able to:

08.01 Identify workplace hazards.
08.02 Use appropriate personal protective equipment.
08.03 Use appropriate lifting techniques.
08.04 Place catch nets/bags.
08.05 Set up safe work zone.
08.06 Implement lock out/tag out.
08.07 Use buddy system where required.
08.08 Monitor breathing zones and wind direction.
08.09 Interpret safety equipment readings.
08.10 Demonstrate knowledge of safety/OSHA regulations.
08.11 Identify hazardous materials handling.
08.12 Demonstrate appropriate fire extinguisher use.
08.13 Demonstrate safe confined space entry procedure.

09.0 **DEMONSTRATE THE ABILITY TO FABRICATE COMPONENT PARTS TO SPECIFICATIONS** - The student will be able to:

09.01 Demonstrate a basic knowledge of applied trigonometry.
09.02 Demonstrate a basic knowledge of machine tools.
09.03 Interpret a basic drawing/blueprint.
09.04 Produce a layout/template.
09.05 Fabricate a sample project.
09.06 Demonstrate the use of brake and shear.
09.07 Demonstrate the ability to finish a component per given requirements.
09.08 Demonstrate the use of precision measuring tools including micrometer and vernier caliper, square, etc.
09.09 Fabricate a project per drawings and specifications.
09.10 Recognize good and bad welds.

09.11 Complete a repair project per drawings and specifications.
09.12 Inspect finished product for conformity.

10.0 **PREPARE, ANALYZE AND EVALUATE TECHNICAL REPORTS AND DATA** - The student will be able to:

10.01 Interpret technical drawings and schematics.
10.02 Demonstrate application of technical drawings and/or schematic specifications.
10.03 Interpret work authorization documents.
10.04 Demonstrate application of work authorization document to task.
10.05 Perform technical reporting and documentation.
10.06 Demonstrate knowledge of work team protocols (engineering support).

11.0 **DEMONSTRATE THE ABILITY TO EVALUATE PROBLEMS, TROUBLESHOOT AND IMPLEMENT APPROPRIATE CORRECTIVE ACTIONS** - The student will be able to:

11.01 Evaluate a given job.
11.02 Select appropriate equipment for a given job.
11.03 Select appropriate materials and supplies for a given job.
11.04 Identify essential personnel for a given job.
11.05 Apply troubleshooting skills where necessary.
11.06 Identify and take corrective action where necessary.

12.0 **SELECT, CONFIGURE, CALIBRATE, OPERATE AND EVALUATE PRECISION TEST EQUIPMENT** - The student will be able to:

12.01 Interpret test procedures.
12.02 Select appropriate test equipment for given test.
12.03 Verify tool and equipment calibration.
12.04 Configure test set up.
12.05 Perform test operations.
12.06 Evaluate test results.
12.07 Identify precision measuring and test equipment.
12.08 Differentiate between destructive and non-destructive testing.

13.0 **DEMONSTRATE APPROPRIATE KNOWLEDGE OF THE OPERATION AND REPAIR OF HIGH PRESSURE HYDRAULIC AND PNEUMATIC SYSTEMS** - The student will be able to:

13.01 Identify various mechanical connections.
13.02 Demonstrate knowledge of the function of regulators, valves, and gauges.
13.03 Identify unique safety requirements and hazards involved with various fluid systems.
13.04 Identify and inspect components and conduits for compatibility with commodities.

13.05 Differentiate between dedicated and multi-purpose components and conduits.
13.06 Assemble, operate, inspect, and test fluid systems.

14.0 **DEMONSTRATE EMPLOYABILITY SKILLS** - The student will be able to:

14.01 Conduct a job search.
14.02 Secure information about a job.
14.03 Identify documents which may be required when applying for a job interview.
14.04 Complete a job application form correctly.
14.05 Demonstrate competence in job interview techniques.
14.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.
14.07 Identify acceptable work habits.
14.08 Demonstrate knowledge of how to make appropriate job changes.
14.09 Demonstrate acceptable employee health habits.
14.10 Demonstrate knowledge of "Florida Right-To-Know Law".
14.11 Demonstrate ability to pass Aerospace Technician Certification written, oral and performance tests.

15.0 **SUCCESSFULLY COMPLETE INTERNSHIP** - The student will be able to:

15.01 Demonstrate a good work attitude
15.02 Demonstrate proper work ethics
15.03 Demonstrate communication skills
15.04 Show job knowledge and basic procedures