

July 2004

**Florida Department of Education  
Division of Community Colleges  
CURRICULUM FRAMEWORK**

**Program Title: AIR TRAFFIC CONTROL**

**Program Numbers: I490105**

**Occupational Area:** Industrial Education PSV

**CIP Number:** 0649.010500 A.A.S. 1649.010500 A. S.

**Grade level:** College Credit

**SOC:** 53-2021

**Length:** A.S./A.A.S. Degree - 65 hours

**I. MAJOR CONCEPTS/CONTENT:** The purpose of this program is to prepare students for employment as air traffic control specialist (193.162-014) that understand basic air traffic control fundamentals as well as Control Tower and Radar facility procedures. The content should include, but not be limited to: human relations, communication skills, leadership skills, and employability skills, safe and efficient work practices, Federal Aviation Administration regulations, aviation safety, human factors and flight psychology, meteorology, navigation and communications.

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Air Traffic Control industry: planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

Instruction is designed to qualify students for examinations for certification as an air traffic controller at the Federal Aviation Administration Academy at Oklahoma City, Oklahoma. Since 65 credit hours, including hands on experience, are required in this curriculum, one summer term will probably be required to complete the program within two years.

**II. LABORATORY ACTIVITIES:** Laboratory activities are an integral and important part of this program. 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 equipment should be maintained in good working order and in a condition for safe operation. Laboratory activities are an integral part of this program and provide instruction in aircraft guidance systems and aircraft flight control systems in simulations and actual air traffic control environments.

**TOOLS AND EQUIPMENT**

1. FM, VHF and UHF Radios
2. Hand tools
3. Radar Systems
4. Light Guns

5. Direct Line Telephones
6. Headsets
7. Flares

### **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 assessments. The only way a person can get authorization to take these examinations is to (1) graduate from the FAA training program offered at Oklahoma City, Oklahoma after obtaining an Associates or Bachelors Degree in this program or (2) obtain Air Traffic Control training from one of the US military training programs.

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.

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

**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 (currently Miami-Dade Community College and Embry-Riddle Aeronautical University) with two or four-year curriculums in this area.

4. The Air Traffic Control Industry has very strict employment rules on prior and current drug use, citizenship status and criminal record that are additional work requirements

students must meet for internships and employment. Students must also meet physical and psychological standards required by the FAA. 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 at least three years of industry experience in the subject area. Instructors should have related industry experience (subject matter expertise) applicable to discipline being taught. For community colleges, the minimum should be in accordance with regional accreditation boards plus at least three years of industry experience in the discipline. All instructors should meet appropriate experience levels required for industry certification where such certifications exist (or knowledge levels should be reviewed by a school advisory board consisting of industry representatives, if available).

**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 program, the student will be able to:

#### **OCCUPATIONAL COMPLETION POINT - DATA CODE - A**

AIR TRAFFIC CONTROL SPECIALIST - DOT CODE 193.162-014 (SOC 53-2021)

- 01.0 Demonstrate an understanding of aviation safety.
- 02.0 Demonstrate an understanding of aviation law.
- 03.0 Demonstrate workforce/workplace readiness skills.
- 04.0 Demonstrate an understanding of Air Traffic Control fundamentals.
- 05.0 Solve basic navigation situations.
- 06.0 Demonstrate an understanding of control tower operating procedures.
- 07.0 Develop an understanding of air traffic control radar/non-radar procedures.
- 08.0 Demonstrate an understanding of federal flight rules and regulations.
- 09.0 Develop an understanding of meteorology.
- 10.0 Interpret Federal Aviation Administration enroute and terminal charts and rules.
- 11.0 Demonstrate knowledge and understanding of aeronautical and aircraft systems.
- 12.0 Demonstrate appropriate communication skills.
- 13.0 Demonstrate appropriate math skills.
- 14.0 Demonstrate appropriate understanding of basic science.
- 15.0 Demonstrate an understanding of business skills.

**VI. STUDENT PERFORMANCE STANDARDS**

**OCCUPATIONAL COMPLETION POINT - DATA CODE - A**

AIR TRAFFIC CONTROL SPECIALIST - DOT CODE 193.162-014

01.0 **DEMONSTRATE AN UNDERSTANDING OF AVIATION SAFETY**--The student will be able to:

- 01.01 Explain proximity limits around jet aircraft, large propeller driven aircraft and small general aviation aircraft.
- 01.02 Identify dangerous weather conditions and explain how they affect navigation and aircraft performance.
- 01.03 Differentiate between various causes of airsickness and spatial disorientation.
- 01.04 Explain the ATC system as it operates today and the safety aspects.
- 01.05 Define hypoxia and hyperventilation and list the causes of each.
- 01.06 Explain how human factors influence aviation safety.

02.0 **DEMONSTRATE AN UNDERSTANDING OF AVIATION LAW**--The student will be able to:

- 02.01 Explain and define liability, pilot in command, owner and other terms used in aviation law.
- 02.02 Explain the differences between civil and military law as it relates to aviation and why they differ.
- 02.03 List and describe the agencies both federal and international that affect aviation laws and regulations.

**03.0 DEMONSTRATE WORKFORCE/WORKPLACE READINESS SKILLS**—

The student will be able to:

- 03.01 Identify reasons people work.
- 03.02 Describe connections between jobs, careers, family life, etc.
- 03.03 Conduct an individual inventory of personal work experience skills.
- 03.04 Develop a career plan.
- 03.05 Understand the information and ability required for different careers.
- 03.06 Compare occupation requirements and benefits associated with employment.
- 03.07 Locate, select, and process classified newspaper and magazine advertisements.
- 03.08 Identify and locate government and private employment agencies and/or computer-assisted job search programs.
- 03.09 Identify and locate personal resource materials (birth certificates, diplomas, training certificates, driver's license, and social security card).
- 03.10 Understand the importance of personal/professional job search information.
- 03.11 Develop a job card file (for specific job leads, requirements, employer names, interview information, and personal notes).

- 03.12 Use appropriate communication skills when using the telephone or email to talk with an employer.
- 03.13 Describe and give examples of job interview situations, including prepared questions to ask the job interviewer.
- 03.14 Identifies proper behavior/attitudes for job interviews.
- 03.15 Demonstrates skillful methods in job interviews (grooming, dress, and verbal/nonverbal communication techniques).
- 03.16 Develop a personal fact sheet that includes personal references, work history, educational information, and other related information.
- 03.17 Read, interpret, and complete a job application and attach a well composed resume' with cover letter.
- 03.18 Write a follow-up letter after the interview with appropriate comments.
- 03.19 Interpret wages, deductions, benefits, and taxes.
- 03.20 Interpret timekeeping forms, timecards, and timesheets, as applicable.
- 03.21 Interpret pay schedules and fringe benefits, medical insurance, and retirement plans.
- 03.22 Understand the importance of contracts and union agreements.
- 03.23 Show knowledge of employee handbooks, personnel policies, and workers compensation.
- 03.24 Identify safety signs found in places of employment and safe work procedures.
- 03.25 Understand the importance of reporting health and safety questions to the appropriate person.
- 03.26 Understand safe work clothes and good health rules/appropriate dress habits.
- 03.27 Understand relations to job training, performance, retention, promotion and changes by describing career job goals.
- 03.28 Identify feelings and opportunities that affect success for job advancement and retention.
- 03.29 Demonstrate the ability to apply or transfer skills learned in one job situation to another.
- 03.30 Identify computer skills that affect job retention and advancement.
- 03.31 Interpret and write work related correspondence (notes, memos, and letters).
- 03.32 Know how to react to constructive criticism and when to make personal changes or resign from a job.
- 03.33 Analyze and solve workforce problems.
- 03.34 Demonstrate appropriate use of the phone or cell phone in a workplace setting.
- 03.35 Demonstrate the ability to work with others and communication skills while addressing customers and clients.
- 03.36 Demonstrate the process of taking action to meet the needs and solve the problems of customers.
- 03.37 Demonstrate effective body language and its influence on the observer.
- 03.38 Identify sexual harassment issues in the workplace.

- 03.39 Identify and use different approaches when working within multicultural workforce groups.
  - 03.40 Identify techniques for handling stress and time management problems on the job.
  - 03.41 Understand the advantages and disadvantages of a computer, possible uses of a computer system, and proper procedures to maintain computer/network security.
  - 03.42 Demonstrate knowledge of "Florida Right-To-Know Law" as recorded in Florida statues Chapter 442.
  - 03.43 Demonstrate ability to pass Air Traffic Control Certification written, oral and performance tests.
- 04.0 **DEMONSTRATE AN UNDERSTANDING OF AIR TRAFFIC CONTROL FUNDAMENTALS**--The student will be able to:
- 04.01 Specify information requirements used in recording air traffic control data on FAA Forms.
  - 04.02 Identify requirements for Special Visual Flight Rule (SVFR) operations.
  - 04.03 Describe and explain air traffic control service priorities.
  - 04.04 Explain the use of radios and frequency Channelization.
  - 04.05 Specify air traffic control communications requirements.
  - 04.06 Explain basic facts concerning air traffic control equipment requirements.
  - 04.07 Describe airport operational areas.
  - 04.08 Identify characteristics of airspace classifications.
  - 04.09 Identify characteristics about special use airspace.
  - 04.10 Describe flight altitude rules and characteristics.
  - 04.11 Describe the general contents of Flight Information Publications maintained in air traffic control facilities.
  - 04.12 Describe uses of air navigational aids.
  - 04.13 Describe airport condition reporting requirements.
  - 04.14 Explain the basics about airport advisory services.
- 05.0 **SOLVE BASIC NAVIGATION SITUATIONS**--The student will be able to:
- 05.01 Define radio navigation and be able to explain VOR and loran principles.
  - 05.02 Define great circle, meridian, longitude, latitude and conic projection.
  - 05.03 Explain and understand the sectional charts used in aviation.
  - 05.04 Explain radar, INS, VOR, and GPS navigation, and the use of DME and RNAV principles while flying a heading, course, or dead reckoning.
  - 05.05 Define radial, bearing, TACAN, MEA, ASR, IFR, VFR and holding pattern.
  - 05.06 Describe the general characteristics of MVA/MEA/MOCA.
- 06.0 **UNDERSTAND CONTROL TOWER OPERATING PROCEDURES**—The student will be able to:
- 06.01 Describe the airfield operating areas and explain the characteristics of taxiway, runway, helipad, and closed runway markings; the ramps; the

- principles of airport lighting; special parking areas; and the precision approach critical areas protection requirements.
- 06.02 Describe the functions of the tower/radar coordination equipment and the light gun operational characteristics
  - 06.03 Explain how to use the tower radar displays and communication nets in an airport environment.
  - 06.04 Describe ground control operating requirements for surveillance of surface/movement areas.
  - 06.05 Identify methods used to determine aircraft positions on the airfield.
  - 06.06 Explain general principles used to control vehicles, equipment, and personnel on the airfield operating areas.
  - 06.07 Describe the general principles of taxi operations.
  - 06.08 State the specific elements of departure information.
  - 06.09 Describe the general principles of observed abnormalities.
  - 06.10 Describe the requirements for surveillance of surface/movement areas.
  - 06.11 Explain procedures for tower evacuation alarms and primary crash alarm system characteristics.
  - 06.12 Explain the procedures related to a crash grid map.
  - 06.13 Identify the components of the Automatic Terminal Information Service.
  - 06.14 Describe the characteristics of the active runway use and selection requirements.
  - 06.15 State the elements of landing information.
  - 06.16 State the requirements for a wheels check in a control tower environment.
  - 06.17 State the elements of a landing clearance.
  - 06.18 Describe the minimum distance without final clearance/cancellation of landing clearance.
  - 06.19 Explain the requirements for a landing clearance without visual observation and for an altitude restricted low approach.
  - 06.20 Explain the elements of a missed approach.
  - 06.21 Explain the requirements to issue runway exiting instructions, departure control instructions, and taxi into position and hold operations.
  - 06.22 Describe the requirements for closed/unsafe runway operations.
  - 06.23 Describe the instructions for communication failure/receiver only acknowledgement operations.
  - 06.24 Describe the characteristics of tower traffic patterns, principles for helicopter operations, procedures for transition from IMC to VFR flight, and the principles of traffic advisories.
  - 06.25 Describe the principles of sequencing and separating arrival and departure traffic.
  - 06.26 Describe wake turbulence separation, wake turbulence cautionary advisory, and visual separation criteria.
  - 06.27 Describe the requirements for simultaneous same and opposite direction runway operations and intersecting runway separation criteria.

**07.0 DEMONSTRATE AN UNDERSTANDING OF AIR TRAFFIC CONTROL RADAR/NON RADAR PRINCIPLES**—The student will be able to:

- 07.01 Describe methods of radar identification and the general principles of secondary radar systems.
  - 07.02 Explain the characteristics of inter/intra facility coordination.
  - 07.03 Describe the procedures used by aircraft experiencing communication failures.
  - 07.04 Describe the basic radar services provided to VFR aircraft.
  - 07.05 Explain the characteristics of traffic advisories, separation criteria, and the requirements for sequencing and separating arrivals and departures.
  - 07.06 Describe the contents of an IFR clearance.
  - 07.07 Explain the procedures use for VFR on top, climb to VFR instructions, and characteristics of radar departures.
  - 07.08 Describe specific approach and arrival information requirements.
  - 07.09 Describe principles of holding instructions and speed adjustment methods.
  - 07.10 Describe altitude requirements in a non-radar environment.
  - 07.11 Describe airport surveillance radar equipment operations and explain video mapping.
  - 07.12 Explain the components of secondary radar equipment and identify radar functions of the tower/radar coordination equipment.
  - 07.13 Explain the principles of radar approaches and identify the relationships between ASR approach requirements.
  - 07.14 Describe non-radar methods to monitor airborne aircraft and explain basic non-radar separation principles for arriving and departing aircraft and successive departures.
  - 07.15 Describe principles for non-radar altitude assignments and route assignments in protected airspace.
  - 07.16 Explain principles used in a non-radar environment to control approach/arrival aircraft and the use of timed approaches.
- 08.0 **DEMONSTRATE AN UNDERSTANDING OF FEDERAL FLIGHT RULES AND REGULATIONS**--The student will be able to:
- 08.01 Describe the general contents of regulatory publications.
  - 08.02 Explain major portion of Parts 1, 61, 67, 91, 121, 135, and 830 of the Federal Aviation Regulations.
  - 08.03 Explain the Notice to Airmen system.
- 09.0 **DEVELOP AN UNDERSTANDING OF METEOROLOGY**--The student will be able to:
- 09.01 State the names of the major civilian and military weather organizations.
  - 09.02 Explain why the military needs its own weather service.
  - 09.03 Describe the effects of weather on aircraft.
  - 09.04 Name and state the function of at least three instruments meteorologists use in gathering weather data.
  - 09.05 Name and describe two types of weather satellites.
  - 09.06 Interpret weather surface charts, station sequence reports, terminal reports and area forecasts.
  - 09.07 Analyze and predict weather using meteorology charts, maps and reports.

- 09.08 Explain the Cooperative Weather Watch requirements.
- 09.09 Explain the specific components and acronyms of weather reports.
- 09.10 Explain what constitutes weather minimums for VFR and IFR flights.
  
- 10.0 **INTERPRET FEDERAL AVIATION ADMINISTRATION ENROUTE AND TERMINAL CHARTS AND RULES**--The student will be able to:
  - 10.01 Explain enroute low and high charts and their legend.
  - 10.02 Explain terminal charts and understand the legend.
  - 10.03 Understand FAR parts 61, 91 of the Federal Aviation Regulations.
  
- 11.0 **DEMONSTRATE KNOWLEDGE AND UNDERSTANDING OF AERONAUTICS AND AIRCRAFT SYSTEMS**--The student will be able to:
  - 11.01 Differentiate between aeronautics and aerodynamics.
  - 11.02 State and give examples of Newton's three laws of motion.
  - 11.03 Name and compare the four forces of flight.
  - 11.04 Describe general aircraft emergency operations.
  - 11.05 Describe an airfoil.
  - 11.06 State how lift is produced and lost.
  - 11.07 Discuss how and why an airplane compressor and/or engine stalls.
  - 11.08 Identify and describe the parts of a reciprocating engine.
  - 11.09 Understand the difference between reciprocating engines and the jet engine and how air temperature/conditions affect their performance.
  - 11.10 Define turbine and ramjet principles.
  - 11.11 Explain the electrical and hydraulic systems on small aircraft.
  - 11.12 Describe and explain how pitot, vacuum, pressure and engine instruments work.
  - 11.13 Describe Crew Resource Management concepts.
  - 11.14 Explain how the magnetic compass works and the difference between True North and Magnetic North.
  
- 12.0 **DEMONSTRATE APPROPRIATE COMMUNICATION SKILLS**--The student will be able to:
  - 12.01 Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.
  - 12.02 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
  - 12.03 Read and follow written and oral instructions.
  - 12.04 Answer and ask questions coherently and concisely.
  - 12.05 Read critically by recognizing assumptions and implications and by evaluating ideas.
  - 12.06 Demonstrate appropriate landline/telephone/communication skills.
  
- 13.0 **DEMONSTRATE APPROPRIATE MATH SKILLS**--The student will be able to:
  - 13.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.

- 13.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
- 13.03 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
- 13.04 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
- 13.05 Demonstrate an understanding of federal, state and local taxes and their computation.
- 13.06 Calculate and determine airspeeds and explain why we use knots per hour rather than miles per hour.

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

- 14.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
- 14.02 Draw conclusions or make inferences from data.
- 14.03 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.
- 14.04 Understand pressure measurement in terms of P.S.I. (pounds per square inch), and kPa (kilopascal).
- 14.05 Explain what is meant by temperature inversion.
- 14.06 Describe human factors applications used in the air traffic control system.

15.0 **DEMONSTRATE AN UNDERSTANDING OF BUSINESS SKILLS**--The student will be able to.

- 15.01 Identify characteristics of the American enterprise system.
- 15.02 Define inflation and deflation.
- 15.03 Illustrate the basic economic questions facing any society.
- 15.04 Determine the results of a change in demand or a change in supply.
- 15.05 List factors, which contribute to economic growth.
- 15.06 Identify characteristics of different types of business ownership.
- 15.07 Choose appropriate action in a situation requiring application of business ethics.
- 15.08 Explain financial management procedures of an efficient business.

## WEBSITE AND DISTANCE LEARNING INFORMATION

**AIR TRAFFIC CONTROL TECHNICIAN:** The purpose of this section is to provide a sample of the currently available distance learning products and website resources which can be used to enhance the Air Traffic Control program. It is not intended to recommend any specific vendor or online program.

Web Sites
<p><a href="http://www.au.af.mil/au/ccaf">www.au.af.mil/au/ccaf</a> <a href="http://trc.dfrc.nasa.gov/Education/Educator/OnlineEducation/Careers/comm.html">http://trc.dfrc.nasa.gov/Education/Educator/OnlineEducation/Careers/comm.html</a> <a href="http://www.faa.gov">www.faa.gov</a> <a href="http://florida.echoices.com">http://florida.echoices.com</a> <a href="http://www.excelsior.edu/">http://www.excelsior.edu/</a> <a href="http://www.uvsc.edu/disted/">http://www.uvsc.edu/disted/</a> <a href="http://www.aerolearn.com/">http://www.aerolearn.com/</a> <a href="http://www.aopa.org/asf/">http://www.aopa.org/asf/</a> <a href="http://todaysmilitary.com">http://todaysmilitary.com</a> <a href="http://www.careersinthemilitary.com/index.cfm?fuseaction=search.detail&amp;mc_id=67">http://www.careersinthemilitary.com/index.cfm?fuseaction=search.detail&amp;mc_id=67</a></p>
Institutions with related Distance Learning programs in related maintenance, engineering or space operations
<p>*Embry Riddle Aeronautical Univ: <a href="http://www.db.erau.edu">Http://www.db.erau.edu</a> *Miami-Dade Community College: <a href="http://www.mdc.edu">http://www.mdc.edu</a> *Mountain State University: <a href="http://www.mountainstate.edu/">http://www.mountainstate.edu/</a> *Utah Valley State College: <a href="http://www.uvsc.edu/disted/">http://www.uvsc.edu/disted/</a> Aerolearn: <a href="http://www.aerolearn.com/">http://www.aerolearn.com/</a> *<a href="https://www.excelsior.edu/">https://www.excelsior.edu/</a> <a href="http://www.allstar.fiu.edu/">http://www.allstar.fiu.edu/</a></p> <p>* = These programs are offered at a cost.</p>