Course Number: TRAM-2000
OCAS Code: None
Course Length: 77 Hours
Career Cluster: Transportation, Distribution & Logistics
Career Pathway: Aviation Maintenance Technology
Career Major(s): Airframe Mechanic

Pre-requisite(s):

Course Description: Students will study aircraft construction and identify materials used in the construction of aircraft. The student will properly rig control surfaces for stability of flight. The control systems and the aerodynamic forces on the surfaces will also be discussed.

Textbooks:
Dale Crane, Dictionary of Aviation Terms, Aviation Supplies and Academics, 1997
DOT, Aircraft Inspection and Repair, Jeppesen, Sanders, Inc., 1998

Course Objectives:

A. Lesson: ADMINISTRATIVE FORMS AND ENROLLMENT REQUIREMENTS
1. Complete Course Requirement Handout covering policies and procedures.
2. Discuss general safety practices.
3. Identify airframe safety precautions.
4. Discuss MSDS related to Airframe 1.

B. Lesson: INTRODUCTION TO AIRCRAFT STRUCTURES
1. Discuss the evolution of aircraft structures.

C. Lesson: WOOD FUSELAGE CONSTRUCTION
1. List and describe approved woods and allowable defects. (Level 1) (App. C,1,A,2) (AF-A1,A6,A7,A8,A9)
2. Identify and describe usage of truss type fuselage.
3. Compare and contrast monocoque and semi-monocoque fuselage construction and usage.

D. Lesson: WOOD WING CONSTRUCTION
1. Identify semi-cantilever wing construction.
2. Identify cantilever construction.
3. Discuss wood rib construction.
4. List and identify wood spar construction.
5. Discuss inspection of wood structures. (Level 1) (App. C,1,A,2,3) (AF-A11,A12,A13)

E. Lesson: WOOD REPAIRS

**F. Lesson: METAL FUSELAGE CONSTRUCTION**
1. Identify and describe usage of truss type fuselage.
2. Compare and contrast monocoque and semi-monocoque fuselage construction and usage.

**G. Lesson: METAL WING CONSTRUCTION**
1. Identify semi-cantilever construction and discuss its usage.
2. Identify cantilever construction and discuss its usage.

**H. Lesson: EMPENNAGE**
1. Identify empennage components.
2. Describe stability surfaces.
3. Describe control surfaces.

**I. Lesson: ENGINE MOUNTS**
1. Discuss the design and characteristics of piston-style engine mounts.
2. Discuss the design and characteristics of jet-style engine mounts.
3. Describe the purpose and construction of the firewall.

**J. Lesson: LANDING GEAR**
1. Identify types (configurations) of landing gear.
2. Discuss landing gear classifications.

**K. Lesson: BASIC AERODYNAMICS**
1. List properties of the atmosphere that affect aircraft control and performance.
2. Discuss principles of physics that apply to flight and aerodynamics. (AF-F5)

**L. Lesson: THE AIRFOIL**
1. Identify and discuss wing design.
2. Identify and discuss rotor design.
3. Describe other types of airfoils.

**M. Lesson: FLIGHT FORCES**
1. List and define the four flight forces.
2. Discuss the relationship between lift and gravity (weight).
3. Discuss the relationship between thrust and drag.
4. Compare types of drag on an aircraft.

**N. Lesson: AXES OF AN AIRCRAFT, STABILITY AND CONTROL**
1. List the three axes of an aircraft.
2. Describe longitudinal stability and control.
3. Describe lateral stability and control.
4. Describe vertical stability and control.

**O. Lesson: SECONDARY AND AUXILIARY CONTROLS**
1. Discuss the design and function of each of the following types of tabs: trim, balance, servo, anti-servo, and spring.
2. Explain the function of various high lift devices on the wing's trailing edge: plain, split,
3. Describe the purpose of high lift devices on the wing's leading edge: slots, slats, leading edge flaps, stall strips, vortex generators, special wing tips, etc. (AF-F6,F10,F11,F12.)

P. Lesson: HIGH SPEED AERODYNAMICS
1. Discuss high-speed subsonic flight.
2. Define transonic flight.
3. Describe supersonic and hypersonic flight.

Q. Lesson: RIGGING SPECIFICATIONS
1. Locate specifications using appropriate repair manuals. (Level 2) (App. C,I,F,22,23) (AF-F1,F4,F7,F18,F19)

R. Lesson: RIGGING SUPPLIES AND EQUIPMENT
1. Identify types and usages of aircraft control cables.
2. Describe various means of attachment of aircraft control cables.
4. Discuss the usage of pulleys and problems caused by misuse.
5. Describe the function of fairleads.
6. Discuss the usage of pressure seals.
7. Explain the function of bellcranks.
8. Describe the function of control horns.
9. Discuss the function of push-pull rods.
10. Discuss the usage and importance of a rigging chart.
11. Describe the purpose of a tensiometer.
12. Explain the usage of a protractor and contour plates.
13. Demonstrate the turnbuckle lockwire technique. (Level 3) (App. C,I,F,26)

S. Lesson: ASSEMBLY AND RIGGING PROCEDURES
1. Perform a structural alignment check. (Level 2) (App. C,I,F,24) (AF-F8)
2. Discuss the purpose for and procedure used to set wing dihedral angles.
3. Explain the purpose for and procedure used to set wing incidence angle.
4. Describe the purpose and procedure for wing trammeling.
5. Discuss the purpose and procedure for checking fin verticality.
7. Explain the purpose and procedure for a symmetry check.
9. Rig a control system. (Level 3) (App. C,I,F,23,26) (AF-F16,F20,R14)

T. Lesson: INTRODUCTION TO ROTARY-WING AIRCRAFT
1. Discuss the history of rotary wings.
2. Explain the fundamentals and configurations of rotary-wing aircraft.
3. Differentiate between types of rotor craft.
4. Discuss advantages and disadvantages of an autogiro.

U. Lesson: HELICOPTERS
1. Identify various types of helicopters.
2. Compare and contrast rigid rotor, semi-rigid rotor, and fully articulated rotor design.
3. List and explain aerodynamic characteristics of rotor-wing aircraft.
4. Discuss causes and corrective measures for helicopter vibrations.

Teaching Methods: The class will primarily be taught by the lecture and demonstration method and supported by various media materials to address various learning styles. There will be question and answer sessions over material covered in lecture and media presentations. Supervised lab time is provided for students to complete required projects.

Grading Procedures:
1. Students are graded on theory and shop practice and performance.
2. Each course must be passed with seventy (70%) percent or better.
3. Grading scale: A=90-100%, B=80-89%, C=70-79%, F=0-69%.

Description of Classroom, Laboratories, and Equipment:
Tulsa Technology Center campuses are owned and operated by Tulsa Technology Center School District No. 18. All programs provide students the opportunity to work with professionally certified instructors in modern, well-equipped facilities.

Available Certifications/College Credit
The student may be eligible to take state, national or industry exam after completion of the program. College credit may be issued from Oklahoma State University-Okmulgee or Tulsa Community College. See program counselor for additional information.

College Credit Eligibility:
The student must maintain a grade point average of 2.0 or better.