I. INTRODUCTION

A. An aviation maintenance technician must be knowledgeable of not only basic hand tools and equipment but also of precision measuring devices and their correct use. This is an introductory course in precision measurement devices, identification of aircraft hardware, fabrication of fluid lines and tubing, testing, heat treating and inspection of aircraft structures.

B. This is a required course of study for the Associate Degree of Applied Science in Aviation Maintenance Technology.

C. This course is occupationally related and serves as preparation for careers in the field of Aviation Maintenance.

D. Prerequisite: None

II. LEARNING OUTCOMES

Upon successful completion of this course, Shop Practices, the student will:

A. Demonstrate proper usage of basic hand tools and precision measuring devices. (C18,F1,F4,F5,F10)

B. Identify aircraft hardware by its marking and specification numbers. (F1,F5,F10)

C. Fabricate, install, inspect and test fluid lines and fittings. (C18,F1,F5,F10)

D. Perform simple nondestructive inspections. (C18,F1,F5,F10)

E. Understand the principles of heat treatment of ferrous and nonferrous metals and distinguish between properly and improperly made welds. (F1,F5,F10)
III. INSTRUCTIONAL MATERIALS

A. The instructional materials identified for this course are viewable through www.ctcd.edu/books

B. Supplemental Reading: None


III. COURSE REQUIREMENTS

The following will be required of each student for successful completion of this course:

A. Reading Assignment: Students are required to complete all reading assignments prior to the class in which the materials will be discussed. Students are subject to announced and unannounced written and oral examinations on assigned reading material.

B. Projects: Based on instructor’s discretion and availability of resources, the following projects will be assigned:

1. Use a dial indicator to measure runout of a crankshaft.
2. Measure the diameter of a shaft using a vernier micrometer caliper
3. Correctly identify a close tolerance bolt, a corrosion-resistant steel bolt and an aluminum alloy bolt.
4. Demonstrate ability to identify AD rivets, DD rivets, a D rivet and an A rivet.
5. Fabricate a piece of fluid tubing from dimensions provided.

C. Class performance: Students are required to attend all classes and to be in the classroom on time. The instructor can lower a student’s grade because of excessive tardiness. When absent from class for any reason, it is the
student’s responsibility to arrange for and make up assignments missed during the absence.

D. Class Participation: Students will earn a satisfactory grade in the course by attending and regularly participating in class, giving complete attention to class activities, completion of all assigned work and successfully completing the examinations. Students are required to maintain a minimum GPA of 2.0 to receive a passing grade for the class and are encouraged to compute and monitor their GPA as the class progresses.

V. EXAMINATIONS

A. There will be three written examinations for this course covering all the lecture notes and reading material.

B. Practicum: Students will complete projects as assigned by the instructor who will provide all materials and equipment required to properly perform the projects using approved methods. (Projects assigned based on instructor’s discretion and resource availability)

IV. SEMESTER GRADE COMPUTATION

<table>
<thead>
<tr>
<th>EXAMINATIONS</th>
<th>POINTS</th>
<th>POINT TO GRADE RATIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXAM 1</td>
<td>300</td>
<td>900-1000 = A</td>
</tr>
<tr>
<td>EXAM 2</td>
<td>300</td>
<td>800-899 = B</td>
</tr>
<tr>
<td>EXAM 3</td>
<td>300</td>
<td>700-799 = C</td>
</tr>
<tr>
<td>Practicum/Projects 1-5</td>
<td>100</td>
<td>600-699 = D</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1000</td>
<td>0-599 = F</td>
</tr>
</tbody>
</table>

V. NOTES AND ADDITIONAL INSTRUCTIONS FROM COURSE INSTRUCTOR

A. **Course Withdrawal:** It is the student’s responsibility to officially drop a class if circumstances prevent attendance. In order to be officially withdrawn from the course, a student must obtain, complete and file an Application for Withdrawal form with the College. The student’s transcript will show “W” or “F”, depending on whether the student was passing or failing at the time of withdrawal.

B. **Administrative Withdrawal:** Students not meeting course objectives or making satisfactory progress may be withdrawn at the discretion of the instructor.

C. **Cellular Phones and Beepers:** Cellular phones and beepers will be turned off while the student is in the classroom or laboratory.
D. **American’s with Disabilities Act (ADA):** Disability Support Services provide services to students who have appropriate documentation of a disability. Students requiring accommodations for class are responsible for contacting the Office of Disability Support Services (DSS) located on the central campus. This service is available to all students, regardless of location. Explore the website at [www.ctcd.edu/disability-support](http://www.ctcd.edu/disability-support) for further information. Reasonable accommodations will be given in accordance with the federal and state laws through the DSS office.

E. **Instructor Discretion:** The instructor reserves the right of final decision in course requirements.

F. **Civility:** Individuals are expected to be cognizant of what a constructive educational experience is and respectful of those participating in a learning environment. Failure to do so can result in disciplinary action up to and including expulsion.

VI. **COURSE OUTLINE**

A. **Module One:** Hand Tools and Precision Measuring Devices

1. **Learning Outcomes:** upon successful completion of this module, the Student will:

   Understand and demonstrate the use of basic hand tools and precision measuring devices.

2. **Learning Activities:**

   Successfully complete examination 1 on material contained in Module 1. (C18,F1,F4,F5,F10)

3. **Equipment and Materials:**

   Dial indicators, micrometer calipers, vernier calipers, small hole and telescoping gages, dividers and calipers, combination set.

4. **Module Outline One:** Hand Tools and Precision Measuring Devices

   a. **Basic hand Tools**
   
   b. **Measuring Devices**
      1. Dial indicators
      2. Micrometer calipers
      3. Vernier calipers
4. Small hole gages
5. Telescoping gages
6. Dividers and calipers
7. Combination set

B. Module Two: Aircraft Hardware

1. Learning Outcomes: upon successful completion of this module, the Student will:

   Identify aircraft hardware by its markings and specification numbers.

2. Learning Activities:

   a. Successfully complete examination 1 covering material found in Module 1. (F1,F5,F10)

   b. Satisfactorily complete assigned projects. (C18,F1,F5,F10)

3. Equipment and Materials:

   Assorted aircraft hardware for identification.

4. Module Outline Two: Aircraft hardware

   a. Threaded fasteners
      1. Thread fit
      2. Importance of torque
      3. Aircraft bolts
      4. Clevis bolts
      5. Aircraft nuts
      6. Washers
      7. Aircraft screws
   
   b. Cowling fasteners

   c. Aircraft control cable
      1. Nonflexible control cable
      2. Flexible control cable
      3. Extraflexible control cable
      4. Turnbuckles

   d. Aircraft rivets
      1. Rivet material specifications
      2. Rivet head style
      3. Rivet identification
      4. Special rivets
C. Module Three: Fluid Lines and Fittings

1. Learning Outcomes: upon successful completion of this module, the Student will:
   a. Select the correct components for a fluid line installation.
   b. Fabricate a fluid line with the proper fittings and correctly install on an aircraft.

2. Learning Activities:
   Successfully complete examination 2, on material found in this module. (C18,F1,F4,F5,F10)

3. Module Outline Three: Fluid Lines and Fittings
   a. Fluid lines
      1. Rigid fluid lines
         a) Tube cutting
         b) Tube bending
         c) Tubing beading
         d) Tubing flare
            1) Double flare
            2) Single flare
            3) Flared tube end fittings
         e) MS flareless fittings
         f) Swaged tube fittings
         g) Installation of rigid lines
         h) Repair of rigid fluid lines
         i) Identification of fluid lines
   2. Flexible fluid lines
      a) Low-pressure hose
      b) Medium-pressure hose
      c) High-pressure hose
      d) Extra high-pressure hose
      e) Teflon hose
      f) Installation of flexible hoses
   b. Fluid Line Fittings
1. Pipe Fittings
2. Universal or bulkhead fittings
3. AN and AC flared tube fittings

D. Module Four: Nondestructive Inspection

1. **Learning Outcomes**: upon successful completion of this module, the Student will:

   Explain the various types of nondestructive inspections and perform simple inspections using dye penetrant, eddy current, ultrasound, and magnetic particle procedures

2. **Learning Activities**:

   Successfully complete examination 3 on material found in this module. (C18,F1,F4,F5,F10)

3. **Module Outline Four**: Nondestructive Inspections
   
   a. Radiographic Inspection
   1. X-rays
   2. Gamma Rays
   b. Magnetic Particle inspection
   c. Eddy current inspection
   d. Ultrasound inspection
   e. Penetrant inspection
   f. Bonded structure inspection
   g. Welding inspection

E. Module Five: Metal Heat Treatment

1. **Learning Outcomes**: upon successful completion of this module, the Student will:

   Explain the basic principles of heat treatment of both ferrous and nonferrous metals

2. **Learning Activities**:

   Successfully complete examination 3 on material found in this module. (F1,F5,F10)

3. **Module Outline Five**: Metal Heat Treatment
a. Ferrous Metal Heat Treatment
   1. Hardening
   2. Normalizing
   3. Annealing
   4. Tempering
   5. Case Hardening
b. Nonferrous Metal Heat Treatment
   1. Aluminum and Magnesium Alloys
      a) Solution heat treatment
      b) Precipitation heat treatment
      c) Annealing
      d) Heat treatment of rivets
      e) Aluminum alloy temper designation
   2. Titanium Alloys
      a) Stress relieving
      b) Annealing
      c) Thermal hardening
      d) Case hardening
   3. Hardness Testing
      a) Rockwell hardness testing
      b) Brinell hardness testing