I. INTRODUCTION

A. Turbine engine operation is quite different from that of a reciprocating engine. This course is a comprehensive study in inspection, disassembly, and replacement of gas turbine engines, sections and components including operational troubleshooting, analysis and safety.

B. This is an optional 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: Successful completion of the general (G) aviation maintenance courses.

II. LEARNING OUTCOMES

Upon successful completion of this course, Aircraft Turbine Engine Overhaul, the student will:

Overhaul turbine engines; inspect, check and repair turbine engines; remove, install and troubleshoot turbine engines; and demonstrate proper safety procedures. (C18-C20,F1,F6,F10,F17)

III. INSTRUCTIONAL MATERIALS

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


IV. 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: The following projects will be completed by students prior to completion of the final examination at the discretion of the instructor. Only after coverage of the subjects listed below by course material and students having been given the opportunity to practice these tasks, will students be required to demonstrate proficiency in these areas. (Projects will be assigned based in instructor’s discretion and availability of resources)

1. Explain the correct procedures to start, run up and shut down an aircraft turbine engine.

2. Explain the correct procedure to trim a turbine engine.

3. Explain the correct procedure of replacing turbine blades in a turbine wheel, including the correct method of locking the blades in place.

4. Correctly remove and reinstall a burner can in a turbine engine.

5. Demonstrate the correct method to compute the torque that is produced by a torque wrench with an extension installed.


7. Correctly remove and reinstall a fuel nozzle in a turbine engine.

8. Identify the various stations of a turbine engine and tell what pressure and temperature exist at each station during engine operation.

9. Describe the point at which bleed air is taken from a turbine engine.
10 Explain the reasoning for variable-angle inlet guide vanes on some axial-flow compressors.

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 one written examination for this course covering all the lecture notes and reading material with a weight of 100 points.

B. Practicum: Ten projects will be assigned by the instructor with a grade weight point of 10 points per project. See Projects (1-10) listed above. (based on available resources)

VI. SEMESTER GRADE COMPUTATION

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<thead>
<tr>
<th>EXAMINATIONS</th>
<th>POINTS</th>
<th>POINT TO GRADE RATIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXAM 1</td>
<td>100</td>
<td>180-200 = A</td>
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<tr>
<td>Practicum/Projects 1-10</td>
<td>100</td>
<td>160-179 = B</td>
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<tr>
<td>TOTAL 200</td>
<td>140-159= C</td>
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<td></td>
<td>120-139 = D</td>
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<td></td>
<td>0-119 = F</td>
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VII. 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 who is not making satisfactory progress may be withdrawn from the course 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 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.

VIII. COURSE OUTLINE

A. Module One: Turbine Engine Operation

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

   Explain precautions and proper procedures for starting turbine engines and immediate actions required to prevent or minimize engine damage.

2. Learning Activities:

   a. Successfully complete examination 1 covering material presented in Module 1. (F1,F5,F6,F9,F10)

   b. Complete project 1. (F1,F5,F6,F9,F10)

3. Module One Outline: Turbine Engine Operation

   Starting Gas Turbine Engines
   1. Improper Starts
B. Module Two: Turbine Engine Maintenance

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

   Explain on-condition maintenance, trend and performance monitoring used to aid in the maintenance of turbine engines.

2. **Learning Activities:**

   Complete examination 1 covering material presented in Module 2. (F1,F6,F10)

3. **Module Two Outline:** Turbine Engine Maintenance

   a. On-Condition Maintenance
   b. Trend Monitoring
   c. Types of Maintenance

C. Module Three: Turbine Engine Inspection and Repair

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

   a. Explain the use of electronic imaging used to aid maintenance personnel inspecting turbine engines. Conduct routine and non-routine inspections, services and repairs on turbine engines.

   b. Demonstrate proper use of torque wrenches with adaptors and safety wire techniques.

2. **Learning Activities:**

   a. Successfully complete examination 1 covering material presented in Module 3. (F1-F6,F10)

   b. Complete projects: 3-10. (C18,F1-F6,F10)

3. **Equipment and Materials:**
a. Borescope or fiberscope, basic hand tools, torque wrenches with adapters, safety wire 0.020-0.025” diameter, 0.032-0.041” diameter and 0.050-0.060” diameter wire and safety goggles.

b. Non-serviceable turbine engine with service manual on a stand for students to practice maintenance techniques and repair procedures.

4. Module Three Outline: Turbine Engine Inspection and Repair

a. Borescope, Fiberscope, Electronic Imaging
b. Routine Inspections
   1. Preflight Inspections
   2. Cold Section Inspection
      a) Compressor Cleaning
      b) Compressor Repair
   3. Hot Section Inspection
c. Nonroutine Inspections
   1. Foreign Object Damage (FOD)
   2. Overtemperature or Overspeed Operation
d. Repair Considerations
   a. Torque Wrenches
   b. Safety Wiring

D. Module Four: Turbine Engine Testing

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

   Perform tests on engine instruments, test run and trim a turbine engine according to manufacturer instructions using the JetCal Analyzer/Trimmer.

2. Learning Activities:

   a. Successfully complete examination 1 covering material presented in Module 4. (C18,F1-F6,F10)

   b. Perform projects: 1 and 2. (C18,F1-F6,F10)

3. Equipment and Materials:

   Jet/Cal Analyzer/Trimmer, turbine engine powered aircraft with operator and maintenance manuals and basic hand tools.
4. **Module Four Outline: Turbine Engine Testing**

   Engine Trimming

E. **Module Five: Turbine Engine Troubleshooting**

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

   Troubleshoot turbine engines using logical steps to isolate faults by dividing engine system functions and comparing actual operation to ideal operation.

2. **Learning Activities:**

   Successfully complete examination 1 covering material presented in Module 5. (F1,F5,F6,F9,F10,F12)

3. **Module Five Outline: Turbine Engine Troubleshooting**

   Turbine Engine Troubleshooting