TURBINE ENGINE FUNDAMENTALS & SYSTEMS
Course Syllabus

Course Number: TRPPM-3101
OHLAP Credit: No
OCAS Code: None
Course Length: 56 Hours
Career Cluster: Transportation, Distribution & Logistics
Career Pathway: Aviation Maintenance Technology
Career Major(s): Powerplant Mechanic

Pre-requisite(s):

Course Description:
Turbine engine development, design and construction will be studied. Inlet and exhaust systems will be discussed with safety being emphasized in performing maintenance on turbine engines. Turbine engine lubrication, cooling, ignition, and fuel metering systems will also be discussed and described by types of system and manufacturer. Students will inspect and service systems.

Textbooks:
- Dale Crane, Dictionary of Aviation Terms, Aviation Supplies and Academics, 1997
- FAA, FAR Handbook for Aviation Maintenance Technicians, Jeppesen, Sanders, Inc.. 2001
- FAA, Standards for Aviation Maintenance Handbook, Jeppesen, Sanders, Inc.. 1985
- DOT, Aircraft Inspection and Repair, Jeppesen, Sanders, Inc., 1998

Course Objectives:

A. Lesson: TERMS AND SAFETY
1. List safety precautions relating to turbine engines.
2. Define terms and definitions related to turbine engines.
3. Identify and practice turbine-engine safety precautions.

B. Lesson: TURBINE ENGINE DEVELOPMENT
1. Discuss the history of jet propulsion.
2. Identify and discuss torque producing turbine engines.
3. Identify and discuss thrust producing turbine engines.
4. Discuss turbine engine energy transformation cycles.
5. Identify and discuss factors affecting engine thrust.
6. Perform calculations to determine engine thrust.

C. Lesson: TURBINE ENGINE DESIGN AND CONSTRUCTION (PP-B3,B4,P6,P11)
1. Discuss the purpose, construction, and operation of the compressor section.
2. Explain the causes and prevention of compressor stall.
3. Discuss the purpose and operation of compressor bleed valves.
4. Discuss the purpose, construction, and operation of the diffuser section.
5. Discuss the purpose, construction, and operation of the combustion section. (PP-B1)
6. Discuss the purpose, construction, and operation of the turbine section. (PP-B2)
7. Discuss the purpose, construction, and operation of the exhaust section.
8. Discuss the components of the accessory section and their purposes.

D. Lesson: TURBINE ENGINE INLET SYSTEMS (PP-P7)
1. Discuss the purpose and operation of subsonic engine inlets.
2. Discuss the purpose and operation of supersonic engine inlets.
3. Discuss ram pressure recovery.
4. Discuss the purpose and operation of inlet anti-ice systems. (App. D,II,H,26)

E. Lesson: TURBINE ENGINE EXHAUST SYSTEMS
1. Discuss the purpose, construction, and operation of subsonic exhaust systems.
2. Discuss the purpose, construction, and operation of supersonic exhaust systems.
3. Discuss the purpose and operation of afterburners.
4. Discuss the purpose, construction, and operation of thrust reversers. (PP-Q12, Q13)
5. Discuss maintenance, troubleshooting, and repair of engine thrust reverser systems and related components. (Level 1) (App. D,II,J,32b)
6. Discuss the purpose, construction, and operation of noise suppressors.

F. Lesson: INTRODUCTION TO THE LUBRICATION SYSTEM
1. Define terms related to turbine engine lubrication systems.
2. List functions of the lubrication system.

G. Lesson: TYPES OF LUBRICATING SYSTEMS
1. Discuss methods of lubricant application.
2. Explain characteristics and operating principles of wet-sump lubricating systems.
3. Explain characteristics and operating principles of dry-sump lubricating systems.
4. Use schematic to trace oil flow in wet and dry-sump systems.

H. Lesson: OPERATIONS AND COMPONENTS OF THE LUBRICATING SYSTEM
1. Describe the operation of a turbine-engine lubrication system.
2. Identify the components of a turbine-engine lubricating system and their functions. (PP-K12,K13)

I. Lesson: MAINTAINING AND TROUBLESHOOTING THE LUBRICATION SYSTEM
1. Describe cleaning, inspecting and testing of oil coolers. (PP-K6)
2. Discuss inspection and cleaning procedures for turbine engine oil strainer and screen assembly.

J. Lesson: TURBINE ENGINE COOLING SYSTEMS
1. Discuss turbine engine cooling requirements.
2. Discuss the types and operation of turbine section cooling.
3. Discuss the purpose and construction of engine insulating blankets.
4. Identify the need and discuss the operation of engine nacelle cooling.

K. LESSON: AIRCRAFT TURBINE ENGINE IGNITION SYSTEMS
1. Distinguish between the operations of D.C. and A.C. input systems.
2. Identify types of igniter plugs. (Level 2) (App. D,II,E,18)
3. Test an ignition lead. (Level 3) (App. D,II,E,18)
4. Discuss techniques for cleaning and inspecting igniter plugs.
5. Remove, clean, inspect and install igniter plug. (Level 3) (App. D,II,E,18)
6. Discuss basic troubleshooting and maintenance procedures used on turbine engines.

L. Lesson: TURBINE ENGINE FUEL METERING SYSTEMS
1. Discuss the types and operation of turbine engine fuel system components. (Level 1) (App. D,II,F,20) (PP-N7)
2. Discuss the types and operation of turbine engine fuel spray nozzles. (Level 1) (App. D,II,F,20)
3. Discuss the types and operation of turbine engine fuel controls. (Level 1) (App.
4. Discuss the purpose and operation of turbine engine water injection systems. (Level 1) (App. D,II,F,20)

5. Describe the use of, and methods of, inspecting and servicing turbine engine water injection systems. (Level 1) (App. D,II,F,20)

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.