**I. COURSE TITLE:** Aircraft Reciprocating Engines I

 **COURSE NUMBER:** 2351 **CATALOG PREFIX:** AVIT

**II. PREREQUISITE(S):**

**III. CREDIT HOURS:** 6 **LECTURE HOURS:** 4

 **LABORATORY HOURS:** 2 (2 contact) **OBSERVATION HOURS:**

**IV. COURSE DESCRIPTION:**

This course will introduce the student to theory, operation, construction, overhaul, repair, and assembly of reciprocating aircraft engines. The students will learn how a four stroke five event engine operates and how they are mounted and operated on aircraft. Students will remove and install engines on aircraft. Lab is hands-on where the students will disassembly, inspect, assemble, and troubleshoot four and six cylinder horizontally opposed air-cooled engines. Students will also investigate the operation, construction and overhaul of radial aircraft engines.

**V. GRADING**

A= 90-100

 B= 80-89

 C= 70-79

 D= 60-69

 F= 0-59

Grades of 69 and below will not meet the requirements of the FAA for Mechanic

Certificate .

See catalog for description of other possible grades

**VI. ADOPTED TEXT(S):**

Jeppesen Maintenance

 A&P Technician

Powerplant Textbook

**VII. COURSE OBJECTIVES:**

Students will be able to:

• Inspect and repair a radial engine (1)

• Overhaul reciprocating engine (2)

• Inspect, check, service, and repair reciprocating engines and engine

 installations (3)

• Install, troubleshoot, and remove reciprocating engines (3)

 Objective levels:

Level 1 requires:

Knowledge of general principles, but no practical application.

No development of manipulative skill.

Instruction by lecture, demonstration, and discussion.

Level 2 requires:

Knowledge of general principles, and limited practical application.

Development of sufficient manipulative skill to perform basic operations. Instruction by lecture, demonstration, discussion, and limited practical application.

Level 3 requires:

Knowledge of general principles, and performance of a high degree of practical application.

Development of sufficient manipulative skills to simulate return to service.

Instruction by lecture, demonstration, discussion, and a high degree of practical application.

**VIII. COURSE METHODOLOGY:**

May include but not limited to Lecture and problem solving, independent and group projects, in-class and home assignments, quizzes, and tests. Problem solving will use both graphical and mathematical methods.

Attendance is required.

**IX. COURSE OUTLINE:**

Weeks:

1. Types of reciprocating engines, radial engines, in-line engines, v-type engines, opposed-type engines, engine components, crankcase, crankshafts.

2. Crankshaft types, bearings, connecting rods, pistons, piston rings.

3. Piston pins, cylinders, valves, valve operating mechanisms.

4. Valve clearance adjustment, propeller reduction gears, propeller shafts, engine identification.

Test 1

5. Engine operating principles, energy transformation cycles, firing order, power impulses, two-stroke cycle, work-power considerations.

6. Horsepower, piston displacement, engine efficiency, factors affecting power, specific fuel consumption, distribution of power.

7. Diesel engine technology, diesel combustion, aircraft applications.

8. Engine instrumentation, carburetor air temperature, fuel pressure, fuel flow indicator, manifold pressure, oil temperature, oil pressure.

Test 2

9. Cylinder head temperature, exhaust gas temperature, engine analyzers, tachometer, suction gauge, instrument maintenance practices, ground operations, hydraulic lock, engine starting, engine ground checks.

10. Ignition operation, power check, idle speed and mixture, acceleration and deceleration, engine stopping, engine performance, ignition timing, compression testing, valve adjustment.

11. Engine removal, engine life span, preparation for removal, engine hoisting, engine compartment, engine mounts.

12. Overhaul, top overhaul, major overhaul, overhaul procedures, disassembly, cleaning, visual inspection, structural inspection, liquid penetrant inspection.

Test 3

13. Dimensional inspection, repairs.

14. Reassembly, block testing.

15. Engine installation, ground testing, engine preservation, engine storage, engine de-preservation.

16. Final exam.

**X. OTHER REQUIRED TEXTS, SOFTWARE, AND MATERIALS:**

FAA AC-65-12A

Airframe and Powerplant Mechanics

Powerplant Handbook

 FAA-AC-43.13-1B/2B

Acceptable methods, Techniques, and practices of aircraft inspection and Repair

**XI. EVALUATION:**

Test count – 40% of Final Grade

 Quizzes count – 10% of Final Grade

 Lab Grade counts – 50% of Final Grade

**XII. SPECIFIC MANAGEMENT REQUIREMENTS:**

Class and lab attendance is mandatory. Students are required to be in class and lab to satisfy the time requirement of the FAA. Quizzes cannot be made up. No test can be taken late without prior approval of the instructor.

**XIII. OTHER INFORMATION:**

**FERPA:** Students need to understand that your work may be seen by others. Others may see your work when being distributed, during group project work, or if it is chosen for demonstration purposes. Students also need to know that there is a strong possibility that your work may be submitted to other entities for the purpose of plagiarism checks.

**DISABILITIES:** Students with disabilities may contact the Disabilities Service Office, Central Campus, at 800-628-7722 or 937-393-3431.