**I. COURSE TITLE:** Aircraft Reciprocting Engines II

 **COURSE NUMBER:** 2352 **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 the ignition, electrical, fire protection, and induction/exhaust used on reciprocating aircraft engines. The students will overhaul aircraft engine magnetos. This will include inspection, servicing, and troubleshooting the ignition and ignition harness. Student will remove, disassemble, inspect, and install starters, generators, alternators, and engine instruments. Students will investigate induction and exhaust systems including superchargers and turbochargers which will involve the servicing and troubleshooting of these systems.

**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:

• Overhaul magnetos and ignition harness (2)

• Inspect, service, troubleshoot, and repair reciprocating engine ignition

 systems and components. (2)

• Inspect, service, troubleshoot, and repair reciprocating engine electrical

 starting systems (3)

• Repair engine electrical system components (2)

• Install, check, and service engine electrical wiring, controls, switches,

 indicators, and protective devices (3)

• Inspect service and check generators and alternators for reciprocating

 engines (3)

• Inspect, check, service, troubleshoot, and repair engine fire detection and

 extinguishing systems.

• Inspect, check, troubleshoot, service, and repair engine ice and rain

 control systems (2)

• Inspect, check, service, troubleshoot and repair heat exchangers,

 superchargers, and temperature control systems (1)

• Inspect, check, service, and repair carburetor air intake and induction

 manifolds (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. Induction systems, normally aspirated systems, induction system icing, ice detection and removal, supercharged induction systems, turbocharger systems.

2. Turbocharger control systems, additional turbocharger uses, turbocompound systems.

3. Reciprocating engine exhaust systems, types of exhaust systems, mufflers and heat exchangers, exhaust augmentors, exhaust system maintenance practices, exhaust system inspection.

Test 1

4. Electrical system components, wire types, wire marking, wiring installation, wiring terminals, connectors, terminal strips, bonding, circuit protection, switches, relays and solenoids.

5. DC generators theory of operation, DC generator construction, types of DC generators, armature reaction, generator ratings, generator voltage regulation, generator terminals, DC generator service and maintenance.

6. DC alternators, rotor, stator, rectifiers, alternator controls, DC alternator service and maintenance.

7. DC motors, motor theory, DC motor construction, motor speed and direction, reversing motor direction.

8. Types of DC motors, energy losses in motors, inspection and maintenance of DC motors

Test 2

9. Reciprocating engine starting systems, inertia starter, direct-cranking starters, small engine starters, large engine starters.

10. Reciprocating engine ignition systems, battery ignition system, magneto ignition systems, high-tension systems, low-tension systems, magneto operating principles, magneto speed, auxiliary ignition systems, impulse couplings, induction vibrator, shower of sparks, booster magnetos.

11. Reciprocating engine ignition switch, magneto overhaul, disassembly and cleaning, inspection, assembly and internal timing, bench testing, magneto-to-engine timing, operational check, magneto maintenance, engine analyzer, ignition harnesses.

12. Ignition harness maintenance. , ignition harness testing, spark plugs, spark plug servicing, electronic engine control systems, FADEC systems.

Test 3

13. Reciprocating engines lubrication systems, oil distribution, system classification.

14. Lubricating system components, lubrication system maintenance, oil change and servicing, oil filter replacement.

15. Fire protection systems, engine fire detection systems, thermocouple detector, Fenwal system, Kidde system, Llndberg system, Systron-Donner system, smoke and toxic gas detection systems, inspection and testing, engine fire zones, fire extinguishing agents, fire extinguishing systems, inspection and servicing.

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.