1. **COURSE TITLE\*: Reciprocating Engines II**
2. **CATALOG – PREFIX/COURSE NUMBER/COURSE SECTION\*: AVIT 2402**
3. **PREREQUISITE(S)\*: COREQUISITE(S)\*: None**
4. **COURSE TIME/LOCATION/MODALITY: (*Course Syllabus – Individual Instructor Specific*)**
5. **CREDIT HOURS\*: 3 LECTURE HOURS\*: 2**

 **LABORATORY HOURS\*: 1 (1.5 contact hours) OBSERVATION HOURS\*: 0**

1. **FACULTY CONTACT INFORMATION: *(Course Syllabus – Individual Instructor Specific)***
2. **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.

1. **LEARNING OUTCOMES\*:**
2. Overhaul magnetos and ignition harness
3. Inspect, service, troubleshoot, and repair reciprocating engine ignition systems and components.
4. • Inspect, service, troubleshoot, and repair reciprocating engine electrical starting systems
5. • Repair engine electrical system components
6. • Install, check, and service engine electrical wiring, controls, switches, indicators, and protective devices
7. • Inspect service and check generators and alternators for reciprocating engines
8. • Inspect, check, service, troubleshoot, and repair engine fire detection and extinguishing systems
9. • Inspect, check, troubleshoot, service, and repair engine ice and rain control systems
10. **ADOPTED TEXT(S)\*:**

FAA-H-8083-32 (Powerplant V0l 1&2)

 Aviation Maintenance Technician Handbook AC 43.13-1B/2B

<https://www.faa.gov/sites/faa.gov/files/regulations_policies/handbooks_manuals/aviation/FAA-H-8083-32-AMT-Powerplant-Vol-1.pdf>

<https://www.faa.gov/sites/faa.gov/files/regulations_policies/handbooks_manuals/aviation/FAA-H-8083-32-AMT-Powerplant-Vol-2.pdf>

<https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_43.13-1B_w-chg1.pdf>

<https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC%2043.13-2B.pdf>

**9a: SUPPLEMENTAL TEXTS APPROVED BY FULL TIME DEPARTMENTAL FACULTY (INSTRUCTOR MUST NOTIFY THE BOOKSTORE BEFORE THE TEXTBOOK ORDERING DEADLINE DATE PRIOR TO ADOPTION) \*\*\*.**

1. **OTHER REQUIRED MATERIALS: (SEE APPENDIX C FOR TECHNOLOGY REQUEST FORM.)\*\***
2. **GRADING SCALE\*\*\*:**

Grading will follow the policy in the catalog. The scale is as follows:

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.

1. **GRADING PROCEDURES OR ASSESSMENTS: (*Course Syllabus – Individual Instructor Specific)***

Test count – 40% of Final Grade

 Quizzes count – 10% of Final Grade

 Lab Grade counts – 50% of Final Grade

Class and lab attendance will be graded, two points will be deducted from the grade for each day missed. Quizzes cannot be made up. No test can be taken late without prior approval of the instructor.

1. **COURSE METHODOLOGY: *(Course Syllabus – Individual Instructor Specific)***

May included but not limited to lecture and problems solving, group and lab projects, in-class and home assignments, quizzes and tests. Lab project will be individual and group. Attendance to class and lab is required.

**14. COURSE OUTLINE: *(Course Syllabus – Individual Instructor Specific)***

***(Insert sample course outline with learning outcomes tied to assignments / topics.)***

|  |  |  |
| --- | --- | --- |
| **WEEK** | **DESCRIPTION** | **LEARNING OUTCOMES #** |
| WEEK 1 | Induction systems, normally aspirated systems, induction system icing, ice detection and removal, supercharged induction systems, turbocharger systems. | 8 |
| WEEK 2 | Turbocharger control systems, additional turbocharger uses, turbocompound systems. | 2 |
| WEEK 3 | Reciprocating engine exhaust systems, types of exhaust systems, mufflers and heat exchangers, exhaust augmentors, exhaust system maintenance practices, exhaust system inspection. | 2 |
| WEEK 4 | Test 1Electrical system components, wire types, wire marking, wiring installation, wiring terminals, connectors, terminal strips, bonding, circuit protection, switches, relays and solenoids | 5 |
| WEEK 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. | 4 |
| WEEK 6 | DC alternators, rotor, stator, rectifiers, alternator controls, DC alternator service and maintenance. | 4 |
| WEEK 7 | DC motors, motor theory, DC motor construction, motor speed and direction, reversing motor direction. | 5 |
| WEEK 8 | Types of DC motors, energy losses in motors, inspection and maintenance of DC motors | 5 |
| WEEK 9 | Test 2Reciprocating engine starting systems, inertia starter, direct-cranking starters, small engine starters, large engine starters | 3 |
| WEEK 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. | 2 |
| WEEK 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. | 1 |
| WEEK 12 | Ignition harness maintenance. , ignition harness testing, spark plugs, spark plug servicing, electronic engine control systems, FADEC systems. | 1 |
| WEEK 13 | Reciprocating engines lubrication systems, oil distribution, system classification. | 2, 3 |
| WEEK 14 | Lubricating system components, lubrication system maintenance, oil change and servicing, oil filter replacement.  | 2, 3 |
| WEEK 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. | 7 |
| WEEK 16 | Final Exam |  |

* + Induction systems, normally aspirated systems, induction system icing, ice detection and removal, supercharged induction systems, turbocharger systems.
	+ Turbocharger control systems, additional turbocharger uses, turbocompound systems.
	+ Reciprocating engine exhaust systems, types of exhaust systems, mufflers and heat exchangers, exhaust augmentors, exhaust system maintenance practices, exhaust system inspection.
	+ Test 1
	+ Electrical system components, wire types, wire marking, wiring installation, wiring terminals, connectors, terminal strips, bonding, circuit protection, switches, relays and solenoids.
	+ 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.
	+ DC alternators, rotor, stator, rectifiers, alternator controls, DC alternator service and maintenance.
	+ DC motors, motor theory, DC motor construction, motor speed and direction, reversing motor direction.
	+ Types of DC motors, energy losses in motors, inspection and maintenance of DC motors
	+ Test 2
	+ Reciprocating engine starting systems, inertia starter, direct-cranking starters, small engine starters, large engine starters.
	+ 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.
	+ 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.
	+ Ignition harness maintenance. , ignition harness testing, spark plugs, spark plug servicing, electronic engine control systems, FADEC systems.
	+ Reciprocating engines lubrication systems, oil distribution, system classification.
	+ Lubricating system components, lubrication system maintenance, oil change and servicing, oil filter replacement.
	+ 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.
	+ Final exam.

**15. SPECIFIC MANAGEMENT REQUIREMENTS\*\*\*:**

Class and lab attendance will be graded. Quizzes cannot be made up. No test can be taken late without prior approval of the instructor.

**16. FERPA:\***

Students need to understand that their 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.

**17. ACCOMMODATIONS: \***

Students requesting accommodations may contact Ryan Hall, Accessibility Coordinator at rhall21@sscc.edu or 937-393-3431, X 2604.

Students seeking a religious accommodation for absences permitted under Ohio’s Testing Your Faith Act must provide the instructor and the Academic Affairs office with written notice of the specific dates for which the student requires an accommodation and must do so no later than fourteen (14) days after the first day of instruction or fourteen (14) days before the dates of absence, whichever comes first. For more information about Religious Accommodations, contact Ryan Hall, Accessibility Coordinator at rhall21@sscc.edu or 937-393-3431 X 2604.

**18. OTHER INFORMATION\*\*\*:**

**SYLLABUS TEMPLATE KEY**

**\*** Item cannot be altered from that which is included in the master syllabus approved by the Curriculum Committee.

**\*\*** Any alteration or addition must be approved by the Curriculum Committee

**\*\*\*** Item should begin with language as approved in the master syllabus but may be added to at the discretion of the faculty member.