1. **COURSE TITLE\*: Reciprocating Engines I**
2. **CATALOG – PREFIX/COURSE NUMBER/COURSE SECTION\*: AVIT 2401**
3. **PREREQUISITE(S)\*: None 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 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.

1. **LEARNING OUTCOMES\*:**
2. Inspect and repair a radial engine
3. Overhaul reciprocating engine
4. Inspect, check, service, and repair reciprocating engines and engine installations
5. Install, troubleshoot, and remove reciprocating engines
6. **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 | Types of reciprocating engines, radial engines, in-line engines, v-type engines, opposed-type engines, engine components, crankcase, crankshafts. | 1, 2 |
| WEEK 2 | Crankshaft types, bearings, connecting rods, pistons, piston rings. | 1, 2, 3 |
| WEEK 3 | Piston pins, cylinders, valves, valve operating mechanisms. | 1, 2 |
| WEEK 4 | Valve clearance adjustment, propeller reduction gears, propeller shafts, engine identification. | 1, 4 |
| WEEK 5 | Test 1  Engine operating principles, energy transformation cycles, firing order, power impulses, two-stroke cycle, work-power considerations. | 3 |
| WEEK 6 | Horsepower, piston displacement, engine efficiency, factors affecting power, specific fuel consumption, distribution of power. | 3 |
| WEEK 7 | Diesel engine technology, diesel combustion, aircraft applications. |  |
| WEEK 8 | Engine instrumentation, carburetor air temperature, fuel pressure, fuel flow indicator, manifold pressure, oil temperature, oil pressure. | 1, 3 |
| WEEK 9 | Test 2  Cylinder head temperature, exhaust gas temperature, engine analyzers, tachometer, suction gauge, instrument maintenance practices, ground operations, hydraulic lock, engine starting, engine ground checks. | 3, 4 |
| WEEK 10 | Ignition operation, power check, idle speed and mixture, acceleration and deceleration, engine stopping, engine performance, ignition timing, compression testing, and valve adjustment. | 3, 4 |
| WEEK 11 | Engine removal, engine life span, preparation for removal, engine hoisting, engine compartment, and engine mounts. | 4 |
| WEEK 12 | Overhaul, top overhaul, major overhaul, overhaul procedures, disassembly, cleaning, visual inspection, structural inspection, liquid penetrant inspection. | 4 |
| WEEK 13 | Dimensional inspection, repairs. | 1, 3 |
| WEEK 14 | Reassembly, block testing. | 3, 4 |
| WEEK 15 | Engine installation, ground testing, engine preservation, engine storage, engine de-preservation. | 1, 2 |
| WEEK 16 | Final exam. |  |

* + Types of reciprocating engines, radial engines, in-line engines, v-type engines, opposed-type engines, engine components, crankcase, crankshafts.
  + Crankshaft types, bearings, connecting rods, pistons, piston rings.
  + Piston pins, cylinders, valves, valve operating mechanisms.
  + Valve clearance adjustment, propeller reduction gears, propeller shafts, engine identification.
  + Test 1
  + Engine operating principles, energy transformation cycles, firing order, power impulses, two-stroke cycle, work-power considerations.
  + Horsepower, piston displacement, engine efficiency, factors affecting power, specific fuel consumption, distribution of power.
  + Diesel engine technology, diesel combustion, aircraft applications.
  + Engine instrumentation, carburetor air temperature, fuel pressure, fuel flow indicator, manifold pressure, oil temperature, oil pressure.
  + Test 2
  + Cylinder head temperature, exhaust gas temperature, engine analyzers, tachometer, suction gauge, instrument maintenance practices, ground operations, hydraulic lock, engine starting, engine ground checks.
  + Ignition operation, power check, idle speed and mixture, acceleration and deceleration, engine stopping, engine performance, ignition timing, compression testing, and valve adjustment.
  + Engine removal, engine life span, preparation for removal, engine hoisting, engine compartment, and engine mounts.
  + Overhaul, top overhaul, major overhaul, overhaul procedures, disassembly, cleaning, visual inspection, structural inspection, liquid penetrant inspection.
  + Dimensional inspection, repairs.
  + Reassembly, block testing.
  + Engine installation, ground testing, engine preservation, engine storage, engine de-preservation.
  + 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](mailto: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.