

Engineering and Technology Education Department
Semester Course Syllabus
Fall 2008

AV 2100 - AIRCRAFT RECIPROCATING POWERPLANTS & ACCESSORIES

3 Credits

Instructor: Randy Chesley
Room T 103

I. Catalog Description

Theory of operation, maintenance, and repair of reciprocating engines, exhaust systems, ignition systems, and fuel systems with laboratory applications of principles and components studied.

II. Course Objective

The objective of the course is for each student to gain a theoretical understanding of aircraft reciprocating powerplants including induction, exhaust and lubrication systems as related to normally aspirated turbo supercharged and fuel injected engines. Upon completion, each student will be able to achieve the level of proficiency indicated by the number in parenthesis.

The following material will be covered in AV 2100:

1.	Reciprocating Engines	Chapter 1
2.	Reciprocating Engine Operation, Maintenance, Inspection, and Overhaul	Chapter 2
3.	Induction Systems	Chapter 5, Section A
4.	Lubrication Systems	Chapter 9, Sections A&B
5.	Cooling Systems	Chapter 10, Section A
6.	Ignition Systems	Chapter 8, Section E
7.	Fuel and Fuel Metering	Chapter 7, Section A&B

A. **RECIPROCATING ENGINES**

- (1) 1. Development and Progress
- (1) 2. Principles of Operation
- (2) 3. Power Calculations
- (2) 4. Engine Efficiency
- (1) 5. Engine Requirements and Selection of Aircraft Engines
- (2) 6. Aircraft Engine Classification, Construction, and Nomenclature
- (2) 7. Engine Performance, Operation, Starting-Stopping, and Wear
- (2) 8. Overhaul Reciprocating Engine
- (1) 9. Reciprocating Engine Control Systems
- (2) 10. Install, Troubleshoot, and Remove Reciprocating Engine
- (2) 11. Reciprocating Engine Testing, Run-in and Preservation
- (1) 12. Inspect and Repair 14 Cylinder or Larger Radial Engine
- (3) 13. Troubleshoot Reciprocating Engines

B. INDUCTION SYSTEMS

- (1) 1. Carburetor Air Intake and Induction Manifold
- (1) 2. Engine Ice and Rain Control Systems
- (2) 3. Inspect, Check, Troubleshoot, Service, and Repair Engine Ice and Rain Control Systems
- (1) 4. Principals of Supercharging
- (2) 5. Inspect, check, service, repair heat exchangers and superchargers

C. LUBRICATION SYSTEMS

- (2) 1. Theory and purpose
- (2) 2. Identification and Selection of Lubricants
- (2) 3. Lubricating systems
- (2) 4. Oil dilution systems
- (2) 5. Typical lubrication systems
- (2) 6. System inspection and maintenance
- (3) 7. Inspect, check, service, troubleshoot, and repair engine lubrication systems

D. ENGINE COOLING SYSTEMS

- (2) 1. Types of engine cooling systems
- (2) 2. Air-cooled cylinder construction
- (2) 3. Baffle construction for air-cooled engines
- (2) 4. Repair of engine cooling system components
- (3) 5. Inspection, servicing, troubleshooting, and repair of cooling systems

E. IGNITION SYSTEMS

- (2) 1. Basic Magneto Theory
- (2) 2. Application of fundamental principles
- (2) 3. The high tension magnetos
- (2) 4. Type of high tension magnetos
- (2) 5. Ignition boosters
- (2) 6. Typical high tension ignition system for light aircraft
- (2) 7. The low-tension ignition system
- (2) 8. Low-tension systems for light aircraft
- (2) 9. Low-tension systems for large aircraft
- (2) 10. The compensated cam
- (2) 11. Ignition harness
- (2) 12. Spark plugs
- (2) 13. Turbine igniters
- (2) 14. Ignition switches
- (2) 15. Test equipment and its use
- (2) 16. Overhaul magneto and ignition harness
- (2) 17. Repair engine ignition system components
- (3) 18. Inspect, service, troubleshoot, and repair reciprocating and turbine engine ignition Systems and components

F. FUEL AND FUEL METERING SYSTEMS

- (2) 1. Repair of engine fuel system components
- (3) 2. Inspect, check, service, troubleshoot, and repair engine fuel systems
- (3) 3. Overhaul carburetor
- (3) 4. Repair engine fuel metering system components
- (3) 5. Inspect, check, service, troubleshoot, and repair reciprocating and turbine engine Fuel metering systems

G. ENGINE INSTRUMENT SYSTEMS

- (2) 1. Troubleshoot, service, and repair fluid rate-of-flow indicating systems
- (3) 2. Inspect, check, service, troubleshoot, and repair engine temperature, pressure, and R.P.M. indicating systems

III. Text

A&P Technician Powerplant Textbook ISBN 0-88487-207-6
 A&P Technician Powerplant Workbook ISBN 0-88487-243-2
 A&P Technician Powerplant Study Guide ISBN 0-88487-208-4
 AC 43.13 1A & 2A Aircraft Inspection & Repair/Aircraft Alterations

IV. Grades

Determined by the total points of examinations, quizzes, and lab assignments. At least two major exams will be given.

A	=	90 - 100%
B	=	80 - 89%
C	=	70 - 79%
D	=	60 - 69%
F	=	Below 63%

V. Examination Schedule

Quizzes	300 points
Two Major Examination	400 points
Final Examination	<u>300 points</u>
Total	1000 points

VI. Attendance

Daily attendance is required for this class and will be in accordance with FAR 147. A minimum of 59 clock hours are required in this course. It will be the A & P student’s responsibility to consult with the instructor and determine his/her attendance status. All absences during a semester must be made up before FAA powerplant certification can be granted. Any days missed may be made up by turning in a **typed 400 word minimum** report on the subject material missed. This report must be **turned in by Friday of the following week**. Each day you miss, a -25 points will be recorded. When a report is received by the deadline, the -25 points will be removed and a credit will be given just as if you were in attendance. If you elect not to turn a report in as stated above, the minus points will be deducted from your final grade and the number of hours missed need to be made up prior to the qualification test. When the time is made up after the quarter, it will not change your final grade.

VII. Accommodation for Persons with Disabilities

If a student has a disability that will likely require some accommodation by the instructor, the student must contact the instructor and document the disability through the Disability Resource Center, preferably during the first week of the course. Any request for special considerations relating to attendance, pedagogy, taking of examinations, etc., must be discussed with and approved by the instructor. In cooperation with the Disability Resource Center, course materials can be provided in alternative formats--large print, audio, diskette, or Braille.

VIII. Lecture Schedule

1. Class lecture time will start at the time outlined in the USU directory of classes.
Note: There will be a lecture the first day.
2. In the event the instructor is unable to attend the class lecture, the following procedure should be followed.
 - a. The class representative will have an attendance sheet for those who attend class to sign.
 - b. During class time, each student should review that section of the powerplant textbook that would have been presented.

IX. Handouts

Any material handed out in class should be kept and used for additional information and studying for tests.

X. Formal Written Reports

1. May be typed or done on a computer using standard 8 ½ x 11 white paper.
2. Illustrations may be drawn or copied and inserted in the proper order.
3. All reports are to have a cover page with title of report, your name, course number, department, and date due as shown in the example:

EXAMPLE

_____ (your name)

THE OTTO CYCLE

Course Number (AV 2100)

Engineering and Technology Education Department
College of Engineering
Utah State University
Logan, UT

Date Due

XI. Oral Presentation

Assigned subject will be given with enough time for preparation and should be limited to a maximum of ten minutes. These presentations may be given in class, lab, or personally.

XII. Workbook, Study Guide, and Question Book

Homework consists of the following:

1. Assigned reading in the powerplant section textbook, complete instructor questions, and turn in when required.
2. Fill in questions in powerplant section workbook; **add page number where answers are found in the powerplant textbook.**
3. Review aviation mechanic powerplant question book and powerplant section study guide. Be able to answer questions when required. This may be in the form of written test, oral presentation, or questioning in lecture or lab.