SAN JOSE STATE UNIVERSITY
College of Engineering
Department of Aviation & Technology
Aviation 043 - Propulsion Theory-Reciprocating Engines
Section 01 (lecture) and Section 11/12 (labs) Spring 2017

Instructor: Daniel L. Neal

Office Locations: RHV Faculty Offices (RHV 110) and IS 106

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Office Hours: Mondays 5pm to 6pm or by appointment at IS-106.
One hour before each lab session (at RHV 120)
Regular advising hours are available by appointment using Flash Appointments

Class Days/Time: Class (Section 1) Monday 1800-1945
Labs: Section 11 Wednesday 1800-2045
Section 12 Thursday 900-1145

Classroom: Section 1(lecture) – IS 216
Section 11(lab) RHV 110 & 120
Section 12 (lab) RHV 110 & 120

Prerequisites: Physics 2A, Physics 2B (2B can be taken as corequisite)

COURSE OUTLINE

Course Description:

Students will learn the operational and analytical aspects of the propulsion theory of reciprocating aircraft engines, aircraft fuel systems and components, fundamental systems, maintainability and reliability methods, and regulations related to engines. Students will understand aircraft engine maintenance requirements and will perform key maintenance activities. Students will acquire an understanding of cockpit operational conditions and the effect of aircraft engine performance parameters on cockpit indications.

Lab activities will involve operation, servicing, troubleshooting and maintaining aircraft piston engines.

Course Objectives:

Upon completion of this course, students will be able to:

- Describe the general operating characteristics of typical reciprocating engines and their systems/components.
- Apply knowledge from the prerequisite courses to analyze reciprocating engine performance.
- Apply knowledge from the above objectives to the current operational and maintenance practices for aircraft engines.
- Understand FAA regulations that apply to aircraft engines.
- Perform preventive maintenance to aircraft engines and understand required maintenance practices.

Canvas:

Course materials such as the syllabus, major assignment handouts, lab assignments, and lecture notes are available on the Canvas site for the Avia 43 course. Registered students will be added to the Avia 43 Canvas shell. The Canvas login is located here: https://idp01.sjsu.edu/idp/Authn/UserPassword Use your student ID and MySJSU password to log in.

Required Text:

Kroes, Aircraft Powerplants, Glencoe Aviation Technology Series, 8th Edition (2014)

Other Reading:

FAR/AIM Federal Aviation Regulations (2016 revision) – this publication is available at no cost online at the FAA website here: http://www.ecfr.gov/ (use this truncated link and select Title 14 of the CFR for the Federal Aviation Regulations)

Evaluation Criteria & Weights:

Mid-Term Exams (2)	20%
Final Comprehensive Exam	20%
Homework, quizzes, and lab quizzes	20%
Lab Performance and Lab Reports	40%
Total	100%

Evaluation Criteria & Weights:

A = 100% to 90%
B = 89% to 80%
C = 79% to 70%
D = 69% to 60%
F = < 59%
There will be no make-ups for missed quizzes. There will be no make-ups for missed exams, unless prior arrangements are made with the instructor.

Classroom and Protocol:

Do not use cell phones during class. It is acceptable to use your tablet or laptop during class to take notes or look up information pertinent to the lecture. It is not acceptable to watch unrelated videos or participate in online gaming during class. Students are expected to attend class regularly, arrive on time and be prepared to participate.

Dropping and Adding:

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester's Catalog Policies section at http://info.sjsu.edu/static/catalog/policies.html. Add/drop deadlines are as follows: February 9th – last day to drop without a "W" grade for Spring 2016. The Late Drop Policy is available at http://www.sjsu.edu/aars/policies/latedrops/policy/**.** Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the Advising Hub at http://www.sjsu.edu/advising/.

University Policies
Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs' Syllabus Information web page at http://www.sjsu.edu/gup/syllabusinfo/"

Consent for Recording of Class and Public Sharing of Instructor Material

University Policy S12-7**,** requires students to obtain instructor's permission to record the course (or portions of the course).

- Common courtesy and professional behavior dictate that you notify someone when you are recording him/her. You must obtain the instructor's permission to make audio or video recordings in this class. Such permission allows the

recordings to be used for your private, study purposes only. The recordings are the intellectual property of the instructor; you have not been given any rights to reproduce or distribute the material.

- Permission to record course content is to be granted on a class-by-class basis.
- Should there be a guest speaker, permission to record content shall be requested from the guests as well.
- Course material developed by the instructor is the intellectual property of the instructor and cannot be shared publicly without his/her approval. You may not publicly share or upload instructor generated material for this course such as exam questions, lecture notes, or homework solutions without instructor consent.

Key dates

2/7/17 – last day to drop courses without entry onto the student's permanent record.
2/14/17– last day to add a course for the Spring 2017 term.
5/22/17 – Final Exam for Avia 43 - 1715-1930

Lab Requirements:

General:

Do not use cell phones during lab. Do not bring food or drinks into the lab/hanger while lab activities are in progress. Students are expected to attend lab regularly, arrive on time and be prepared to participate.

Lab Reports:

There will be approximately six lab reports assigned to document your lab activities. These reports will make up 40% of your grade, so it is important to submit university quality work on time. Most of the reports are assigned as individual reports. Some are allowed to be submitted as a group report. It is each student's responsibility to make sure that his/her lab reports are submitted on time. Group reports must be submitted with a memo style cover sheet and all participating student names must be typed in the "from" line. Adding a student name to the memo with a pen or pencil is an indication that the added student didn't actually participate in the preparation of that report. This action is considered cheating by all of the submitting students. Students attempting to do this will receive a "0" on that report. We will discuss lab reports at length during the first lab session. All lab reports are expected to be typed. Raw data collected as notes in lab can be attached as an appendix.

Lab Safety:

Students are required to wear safety glasses and closed toe shoes in the lab at any time that lab activities are in progress. Students are required to come equipped with safety glasses that meet the ANSI Z87.1-2010 specification. These are available at the Spartan Bookstore, and at Lowes, Home Depot, or Orchard Supply Hardware (and at just about any other hardware store).

Tools and equipment:

Use the correct tool(s) for the job and use them correctly. If you cannot locate tools, check with the instructor. Notify the instructor of any missing or broken tools or equipment.

Lab projects, engines and parts are required be handled and organized properly at all times.

The lab/hanger must be left clean and orderly each day. All tools and equipment must be cleaned and returned to their proper location. Work benches must be wiped down, floors swept, and seats pushed under tables/benches.

Lecture Schedule & Reading Assignments:

Aviation 43 - Spring 2017 - Lecture Planning Calendar			
Date	Meeting #	Topic/Notes	Reading
26-Jan		Spring 2017 - first day of instruction	
30-Jan	1	Greensheet review, permission codes Federal Aviation Regulations (FARs) Aircraft powerplant classification Reciprocating engine theory	Greensheet Chapter 1 Chapter 2
6-Feb	2	Power definition, power measurement, valve systems, camshaft timing	Chapter 3
7-Feb		Last day to drop classes without a permanent record entry	
13-Feb	3	Fuels and fuel performance	
14-Feb		Last day to add courses for Spring 2017	
20-Feb	4	Engine overuaul requirements and practices Combustion, basic fuel systems, carburetion Midterm 1 preparation session	Chapter 10 Chapter 6
27-Feb	5	Midterm #1	
6-Mar	6	Ignition systems and spark plugs	Chapter 8
13-Mar	7	Lubricants and lubricating systems	Chapter 4
20-Mar	8	Lubrication	
		Spring Break - 3/27 through 3/31	
3-Apr	9	Fuel systems - fuel injection. In flight fuel system operational techniques. Midterm #2 prep session	Chapter 7
10-Apr	10	Midterm #2	
17-Apr	11	Induction systems, cooling systems, exhaust systems. Turbocharging, supercharging, turbo-normalizing	Chapter 5
24-Apr	12	Engine instruments	Chapter 22
1-May	13	Propeller theory and operation Propeller controls	Chapter 20
8-May	14	Aircraft power settings	
15-May	15	Last Day of Instruction - Propeller installation, inspection and maintenance Final Exam Review	
22-May		Final Exam - Monday May 22 at 5:15pm	

Lab Schedule:

Aviation 43 Lab - Spring 2017 Planning Calendar			
Date	Lab Sec	Meeting #	Topic/Notes
26-Jan	12- Thurs 9am	N/A	Spring 2017 - first day of instruction
1-Feb	11 - Wed 6pm	1	Adds/Drops Introduction Precision measurement, fasteners, fastener pre-load, pubications
2-Feb	12- Thurs 9am		
8-Feb	11 - Wed 6pm	2	Lab group assignments
9-Feb	12- Thurs 9am		Engine assessment
15-Feb	11 - Wed 6pm		
16-Feb	12- Thurs 9am		No lab on 2/15 or 2/16
22-Feb	11 - Wed 6pm	3	
23-Feb	12- Thurs 9am		Engine teardown
1-Mar	11 - Wed 6pm	4	
2-Mar	12- Thurs 9am		Engine measurements
8-Mar	11 - Wed 6pm	5	
9-Mar	12- Thurs 9am		Fuel system assessment
15-Mar	11 - Wed 6pm	6	Fuel system assessment
16-Mar	12- Thurs 9am		Airworthiness directives
22-Mar	11 - Wed 6pm	7	
23-Mar	12- Thurs 9am		Component inspection
27-Mar			
			No lab - Spring Break
5-Apr	11 - Wed 6pm	8	
6-Apr	12- Thurs 9am		Engine assembly
12-Apr	11 - Wed 6pm	9	Complete engine assembly
13-Apr	12- Thurs 9am		Ignition system test and evaluation
19-Apr	11 - Wed 6pm	10	Aircraft compression test
20-Apr	12- Thurs 9am		Magneto timing inspection
26-Apr	11 - Wed 6pm	11	Engine test runs
27-Apr	12- Thurs 9am		Aircraft start/run procedures
3-May	11 - Wed 6pm	12	Engine test runs
4-May	12- Thurs 9am		Aircraft start/run procedures
10-May	11 - Wed 6pm	13	Engine test runs
11-May	12- Thurs 9am		Aircraft start/run procedures