

**San Jose State University  
Department of Aviation/Technology  
College of Engineering**

**Avia 068: Avionics/Airborne Communication**

IS 117 S01 Lec: Wed 9:00 am – 10:45am

IS 117 S11 Lab: Mon 9:00 am – 11:45 am

Fall Semester 2013

Office Hours Mon 1:00 – 2:00 pm

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Course Description

Communications and navigation systems installed on a typical general aviation aircraft. History of avionics and laboratory exercises will include field-testing and airworthiness evaluation.

Prerequisite: Avia 42

Text book

Helfrick, Albert.. (2000). 7th Edition. Principles of Avionics. Leesburg, VA: Avionics Communications Inc.

Equipment

Student Purchase:

A soldering iron (25 watts)

Five Inch Wire Cutter/Stripper

Precision Screwdriver Set

Course Objectives

Upon successful completion of this course, the student will have:

- Developed an understanding and working knowledge of the fundamentals of aviation electronics and instrumentation.
- Developed a clear understanding of the instruments used for navigation.
- Developed a clear understanding of VFR and IFR certification/airworthiness requirements for general aviation aircraft.
- Understand the history of avionics.

Course Evaluation Criteria**Examinations**

Midterm #1	Oct 02	10%	100
Midterm #2	Nov 20	10%	100

**Quizzes**

Quiz #1	Sept 11	5%	50
Quiz #2	Oct 23	5%	50

<b>Lab</b>		30%	300
<b>Group Presentation</b>		15%	150
<b>Homework</b>		10%	100
<b>Final:</b>	Dec 11, 2013, Wed. Time: 7:15 am– 9:30 am	15%	150
<b>Total</b>		100%	1000

Grading

97 –100A+	85 - 88 B+	73 – 76 C+	61 – 64 D+
93 - 96 A	81 – 84 B	69 – 72 C	57 – 60 D
89 – 92A-	77 - 80 B-	65 – 68 C-	0 – 56 F

Late Assignments

Late assignments will not be accepted. Assignments include homework and laboratory reports. Homework will be assigned Wednesday of each week and must be submitted at the next Wednesday's class. Due date requirements are similar for lab reports except lab reports will be due the following Monday. Submit one laboratory report per group. All lab experiments will be discussed at the beginning of each lab period.

Missed examination or quiz will be given a score of zero. If you cannot take a scheduled examination or quiz, notification must be given prior to the scheduled examination or quiz date.

## Important Dates-Campus Close (no class)

Monday	September 02	Labor Day
Thursday	November 11	Veteran's Day
Thursday – Friday	November 28– 29	Thanksgiving holiday

University, College, or Department Policy Information

a) **Academic Integrity statement (from Office of Student Conduct and Ethical Development):**

“Your own commitment to learning, as evidenced by your enrollment at San Jose State University, and the University’s Academic Integrity Policy requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the Office of Student Conduct and Ethical Development. The policy on academic integrity can be found at [http://sa.sjsu.edu/student\\_conduct](http://sa.sjsu.edu/student_conduct).”

b) **Campus policy in compliance with the Americans with Disabilities Act:** “If you need course adaptations or accommodations because of a disability, or if you need special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 requires that students with disabilities requesting accommodations must register with DRC to establish a record of their disability.”

### Tentative Calendar

Week of	Lecture Topics	Problems
8/21/13	1.1 History 1.2 Flying Blind What makes an airplane fly? 1.3 Radio Come of Age	1.1,1.2,1.3,1.4,1.5,1.6,1.9,1.10
8/28/13	1.5 Navigation Principles 1.6 National Airspace System Reading a Compass	1.12,1.13,1.14,1.15,1.16
9/04/13	2.1 Non-Directional Beacons & D-Finding 2.2 Direction Finding Receivers 2.3 Automatic Direction Finding	2.3,2.4,2.5,2.8,2.9
9/11/13	- Amplitude Modulation - AM Radio Operation	Hand outs
9/18/13	2.6 VOR: VHF Omni-Range 2.6.1 VOR Indicator 2.10 VOR Ground Station 2.11 VOR Receiver	2.10,2.11,2.13,2.16
9/25/13	2.12 VOR Test Equipment 2.13 DME 2.14 DME Ground Station <b>Group Presentation</b>	2.18,2.20,2.22,2.23,2.24,2.25,2.26,2.27, 2.28,2.29
10/02/13	<b>Midterm #1</b>	
10/09/13	3.0 Introduction 3.1 ILS :Instrument Landing System 3.2 Marker Beacons <b>Group Presentation</b>	3.1,3.2,3.3,3.4,3.5,3.7,3.8,3.9,3.10,3.11
10/16/13	3.3 Glide Slope 3.5 Microwave Landing System(MLS) <b>Group Presentation</b>	3.12,3.13,3.14,3.17,3.19,3.20,3.21
10/23/13	4.1 GPS 4.2 GPS Clocks 4.5 GPS Signals <b>Group Presentation</b>	4.1,4.2,4.3,4.4,4.5,4.6,4.7
10/30/13	4.6 Generating PRN Codes 4.7 PRN Codes <b>Group Presentation</b>	
11/06/13	4.19 GPS Receivers 4.21 GPS Navigation <b>Group Presentation</b>	4.8,4.9,4.10,4.11,4.12,4.13
11/13/13	5.3 Primary Radar 5.4 Secondary Radar <b>Group Presentation</b>	5.1,5.2,5.3,5.4,5.5,5.7,5.8,5.9
11/20/13	<b>Midterm #2</b>	
11/27/13	5.5 Replies 5.6 Mode C <b>Group Presentation</b>	5.10,5.11,5.14,5.15,5.16,5.17,5.18,5.19, 5.20,5.21
12/04/13	5.7 Mode S System <b>Group Presentation</b>	
<b>Final Examination</b>	Wednesday, December 11,2013	Time: 7:15 am – 9:30 am

### Experiment write-up Format

A written laboratory report for each experiment is required. The report should contain the following components:

**Cover Page:** This page includes the title of the experiment, the date, the course number, the course name, and each team member's name.

**Objective:** The objective tells what the experiment is all about. Write short sentences to explain the reasons for doing the experiment.

**Equipment:** Write down the equipment and the components used for the experiment.

**Procedure:** Write down the steps in a logical sequence to do the experiment.

**Theory:** The solution to the expected problem should exemplify the theory with calculations. You simply want to verify your theoretical results or calculations in the laboratory.

**Data:** Your data must represent the experimental results.

**Conclusion:** The conclusion tells what you accomplished by doing the experiment. Did the experimental results agree with the expected results?

**General Comments:** The report must be neat, legible and double spaced, and submitted in type written form. Use simple sentences that get right to the point. Use 8 ½ by 11 inch paper with no holes or perforated edges. Staple all of the pages together at the upper-left-hand corner. Do not tear or fold the corners!

### Class Room Group Presentation

The class room group presentation will be done with two classmates. Select from the topic list or submit a topic of choice for approval. No topics can be presented without my approval. The presentation will be graded as follows:

Content of the Material Presented	5%
Shared Participation by Each Member	5%
Submitting a written report	5%

All presentations should be at least 20 minutes, but not to exceed this limit. We will start the group's presentation per class period September 25, 2013.

<b>Group Presentation Suggested Topics</b>	<b>Presentation Discussion Dates</b>
1. AM Radio	Sept 25
2. Very High Frequency Omni Range	Sept 25
3. Visual Flight Rules / Instrument Flight Rules	Oct 9
4. Distance Measuring Equipment	Oct 9
5. Radio Magnetic Indicator/Horizontal Situation Indicator	Oct 16
6. Instrument Landing System	Oct 23
7. Traffic Collision Avoidance System	Oct 30
8. Emergency Locator Transmitter	Oct 30
9. Global Positioning System	Nov 06
10. Microwave Landing System	Nov 06
11. Radar(primary/secondary)	Nov 13
12. Weather Radar	Nov 27
13. Air Traffic control Radar Beacon System	Nov 27
14. Ground proximity warning system	Dec 04

## Project/Lab

The due date for your group project is Wednesday, December 04, 2013. Laboratory time will be made available to work on your group project. We will start October 07, 2013. Purchase a soldering iron (25 watts), a pair of diagonal-cutting pliers, and a pair of long-nose-pliers. These tools will be required to help with assembling and debugging the radio. Each group will put together an AM Radio Kit (2 classmates per group). You will be able to analyze each stage of the radio, beginning with the antenna. The additional stages are the Mixer, Oscillator, IF Amplifiers, Audio Amplifier, the AGC Circuit and the Speaker. You will use the digital multimeter as well as an oscilloscope to help debug each radio stage. The completion of this project will greatly help you to understand the different types of receivers associated with an aircraft.

Prior to the project we will do several labs to become familiar with laboratory test equipment which will aid you in debugging your radio. You will be given a written experiment write-up to be use for each experiment. We will do five to six experiments. Each laboratory experiment will be discussed in detail at the beginning of the lab period. Upon completion, you must submit a final lab report. **Do not submit the report given to you as an example.** Use the written experiment and the **Experiment Write-Up Format** as a guide to submit your group report.