Lab portion of ES 442 Analog and Digital Communications

Time and day: 1 PM to 3:40 PM T or Th
Location: Salazar Hall, Room 2005

Course Description: Laboratory, 3 hours. Mathematical modeling of signals, time and frequency domain concepts, spectral density, components of a communications system, and analog signal transmission. Analog modulation and demodulation techniques, FDM, noise and bandwidth; Digital signals and their transmission, PCM and low bit rate coders, TDM, data encoding for efficient baseband digital transmission, digital data modulation.

Prerequisites: ES 230 and ES 400, or consent of instructor.

Instructor: Derek Decker
Office hours: Posted at 2010D or by appointment
Phone: (707) 664-4385

Office location: Salazar Hall, Room 2010D
E-Mail: derek.decker@sonoma.edu


Additional course material: may be posted on Moodle. Students are encouraged to read the material ahead of time. Students can access the material by using their Seawolf id and password.

Check Moodle regularly for information, including pre-lab work to be done prior to class.

Grading Policy: This lab accounts for 25% while the lecture accounts for the remaining 75%. This lab requires circuits be working to get credit for lab reports. Lab report grades account for 100% of the grade for this lab. There will be no homework, quizzes, or exams in this lab.

For schedule, see Moodle News Forum announcements.

Be advised: The California Faculty Association is in the midst of a difficult contract dispute with management. It is possible that the faculty union will call a strike or other work stoppage this term. I will inform the class as soon as possible of any disruption to our class meeting schedule.

WITHDRAWAL: No student will be granted a withdrawal after the deadline except under extreme circumstances. Policy regarding withdrawal is stated in the university catalog.

SPECIAL NEEDS: Any student who feels s/he may need an accommodation based on the impact of a disability should contact me privately to discuss your specific needs.
Course Outcomes (COs):
1. Know how to recognize, debug, design, and use circuits involving modulation and demodulation.
2. Know how to design, build and test modulation and demodulation circuits.
3. Perform group lab experiments relating to modulation and demodulation circuits.

Course Learning Objectives (CLOs):
A. Explain the differences between analog and digital communication systems; compare their respective advantages and disadvantages.
B. Understand signal multiplexing, modulation and demodulation; bandwidth requirements; signal power requirements for both analog and digital communication systems; etc.
C. Apply signal and system analytical tools in both the time and frequency domains; including Fourier transforms frequency response, time duration versus bandwidth tradeoffs, impulse response and convolution, etc.
D. Understand analog modulation and demodulation; in particular, amplitude, phase and frequency modulation and demodulation.
E. Application of the Sampling theorem to analog-to-digital conversion and understand the limitations of practical sampling, quantization and encoding.
F. Understand the basic operation of spread spectrum communication systems using both direct sequence and frequency hopping approaches to spread spectrum with examples of current systems.
G. Gain an appreciation for modern communication systems such as 2G, 3G and 4G cellular wireless communication systems.
H. Develop critical thinking skills by analyzing communication systems through associated laboratory activities.

Student Learning Outcomes vs. Course Learning Objectives: (Support Level (0-5) 0=No support, 1=lowest support, 5=highest support)

<table>
<thead>
<tr>
<th>ABET Student Outcomes</th>
<th>Course Learning Objectives</th>
<th>Level of Support</th>
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<tbody>
<tr>
<td>(a) an ability to apply knowledge of mathematics, science, and engineering</td>
<td>A,B,C,D,E,F,G,H</td>
<td>4</td>
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<tr>
<td>(b) an ability to design and conduct experiments, as well as to analyze and interpret data</td>
<td>H</td>
<td>4</td>
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<td>(c) an ability to design a system, component, or process to meet desired needs</td>
<td>A,B,C,D,E,F,G,H</td>
<td>4</td>
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<tr>
<td>(d) an ability to function on multi-disciplinary teams</td>
<td>Not supported</td>
<td></td>
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<tr>
<td>(e) an ability to identify, formulate, and solve engineering problems</td>
<td>A,B,C,D,E,F,G,H</td>
<td>4</td>
</tr>
<tr>
<td>(f) an understanding of professional and ethical responsibility</td>
<td>Not supported</td>
<td></td>
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<td>(g) an ability to communicate effectively</td>
<td>Not supported</td>
<td></td>
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<tr>
<td>(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context</td>
<td>Not supported</td>
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<td>(i) a recognition of the need for, and an ability to engage in life-long learning</td>
<td>Not supported</td>
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<td>(j) a knowledge of contemporary issues</td>
<td>Not supported</td>
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<tr>
<td>(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice</td>
<td>C,E</td>
<td>4</td>
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Assessment Methods:
1. Student lab reports
2. Midterm and Final

Course quality Assessment
1. Student survey of the course
2. Peer instructors feedback
CONDUCT: In order to create an appropriate environment for teaching and learning, students must show respect for their instructor and fellow students. Listed below are a few guidelines for classroom behavior. Students are expected to follow these rules to ensure that the learning environment is not compromised.

Class Participation: You are expected to be in class the entire class time. Please do not enter late or leave early. Rare exceptions may be made, particularly in emergency situations. Your participation in the class and lab and the discussions are very important and would help me understand how much you follow the material. As you go through the material before and after the class jot down your questions and ask me as I go through the material.

Absences: Inform the instructor in advance, if you know you are going to miss a lab. Also, take responsibility for setting up a time with me for you to complete work you missed. Your instructor is not responsible for re-teaching the material you missed due to an absence or being late so it would be to your advantage to find out what you missed from other students.

Conversation: Do not have side conversations in class. Stay focused on finishing the lab in as short a time as is practical. Don’t carry on conversations with people outside the class (ie. No texting, phone, or email with others). Check your texts and emails before coming to class!

Do not sleep or daydream. Stay focused on learning and completing the tasks at hand.

No Internet browsing: Listen for instructions, information, lectures, and advice at all times in the lab. Avoid all other distractions.

Attitude: You are expected to maintain a civil attitude in class. You may not use inappropriate or offensive commentary or body language toward the instructor or fellow students.

Cell phones: You may not use your cell phone during class. Please turn off your cell phone upon entering the classroom.

Academic Honesty: You are responsible to behave ethically and honestly. Copying, cheating, forgery and other unethical or dishonest actions are not tolerated. In such case, the person will receive zero grade and can be reported to SSU authorities. SSU Policy on Cheating and Plagiarism
For more information on SSU's important policies and procedures go to: Important Policies and Procedures for Students