Sonoma State University  
Department of Engineering Science  
EE 230 Electronics I – Spring 2020

Units: 3.0 (lecture)

Schedule/Location: TR, 18:00–19:15 / Salazar 2009A

Instructor: Mohamed Salem  
Office: Salazar 2010B  
Phone: (707) 664-3543  
Email: mohamed.salem@sonoma.edu (Please add [EE230] to email subject)  
Web: https://www.sonoma.edu/users/s/salemmo  
Hours: MW, 14:30–15:30; T, 16:00–17:00 (drop by/email – open door policy)

Prerequisites: EE 220/221, MATH 211, CS 115.

Co-requisites: EE 231.

This textbook is both comprehensive and easy to follow. Student surveys over the past years support this statement. The textbook is also used for EE 330.  
https://dealoz.com/prod?gtin=09780199339136

Software: LTspice XVII  
LTspice is a high performance SPICE simulation software. It will be extensively used in lab experiments. LTspice is available for free for PC and Mac platforms.  

Course Page: https://canvas.sonoma.edu/courses/18872

Description: Theory, characteristics, and operation of diodes, bipolar junction transistors, and MOSFET transistors; analog and digital electronic circuits; design and analysis of analog electronic circuits such as filters, operational amplifiers, and single and multistage amplifiers; modeling and simulation using spice/multisim software.

This reference has a different organization, but covers roughly the same topics. Coverage is not as deep as textbook, but contains interesting applications.  
https://dealoz.com/prod?gtin=09780073529608
Course Policies

Classwork (not graded):
- You are expected to attend all classes and be on time. Inform the instructor of your absence.
- Attendance is taken in class. Unexcused absence for 3 classes may result in failing the class.
- You are highly encouraged to actively participate in class and give feedback after class or anonymously online.

Homework (graded):
- Approximately one homework assignment every other week with total points scaled to ten (10).
- Homework is due at the beginning of session one week after its assignment.
- Late assignments will be awarded up to five (5) points if received within five days of due date.
- Assignments must be completed neatly in pen or pencil, preferably on engineering paper.

Quizzes (graded):
- Quizzes may be given at the discretion of the instructor.
- Quizzes will be awarded up to two (2) points and added to homework grade.
- No make-up quizzes.

Projects (graded):
- A total of three (3) projects to be completed over the semester.
- Projects to be completed in groups, the same lab groups.
- Each project must be completed within about four (4) weeks from assignment.
- Total points for each project is 100.
- Late projects may be awarded up to 80 points if submitted within one (1) week of due date.
- A malfunctioning project may be awarded up to 80 points is accompanied by a report explaining the source of the malfunction.

Exams (graded):
- Two mid-term exams scheduled after completing Chapter 2, and after completing Chapter 4.
- Total points for each exam are scaled to 100.
- One comprehensive final exam scheduled between 17:00-18:50 on Tuesday, May 12, 2020.
- Total points for the final exam are scaled to 200.
- No exam may be taken outside scheduled time without prior arrangement with instructor.
- No exams can be made up if student does not show up at the scheduled or arranged time.
- No electronic devices other than an approved calculator may be used while taking any exams.
Assessment and Grading:

- No late work will be accepted after 17:00, Friday, May 08, 2020.
- It is the student’s responsibility to communicate late submission with instructor.
- Illegible, stained, or scribbled on assignments may receive partial or no credit.
- Final grade is based on the weighting shown below

<table>
<thead>
<tr>
<th>Component</th>
<th>Weighting</th>
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</thead>
<tbody>
<tr>
<td>Homework</td>
<td>10 × 1 %</td>
</tr>
<tr>
<td>Projects</td>
<td>3 × 15 %</td>
</tr>
<tr>
<td>Mid-term exams</td>
<td>2 × 10 %</td>
</tr>
<tr>
<td>Final exam</td>
<td>25 %</td>
</tr>
</tbody>
</table>

Grade scale that will be used for total percentage points and corresponding letter grade are given below

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-59</td>
<td>F</td>
</tr>
<tr>
<td>60-62</td>
<td>D–</td>
</tr>
<tr>
<td>63-66</td>
<td>D</td>
</tr>
<tr>
<td>67-69</td>
<td>D+</td>
</tr>
<tr>
<td>70-72</td>
<td>C–</td>
</tr>
<tr>
<td>73-76</td>
<td>C</td>
</tr>
<tr>
<td>77-79</td>
<td>C+</td>
</tr>
<tr>
<td>80-82</td>
<td>B–</td>
</tr>
<tr>
<td>83-86</td>
<td>B</td>
</tr>
<tr>
<td>87-89</td>
<td>B+</td>
</tr>
<tr>
<td>90-94</td>
<td>A–</td>
</tr>
<tr>
<td>95-100</td>
<td>A</td>
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Note: Passing grades start at C (73%).

Evaluation of Teaching Effectiveness and Feedback

Towards the end of the semester you will be notified by e-mail and provided with a link to follow to complete the Student Evaluation of Teaching Effectiveness (SETE) survey on line outside of class. Your feedback on the course is extremely valuable to the instructor, the department, and the administration. In particular, your comments are taken very seriously and are used to improve the course. Your evaluation is completely anonymous and is never delivered to the instructor before the course grades are due. Please do fill out a course evaluation when you receive the e-mailed link at the end of the semester. For more information on the SETE survey, please refer to:

https://www.sonoma.edu/aa/sete/

In addition to the SETE, please use the anonymous feedback link on Canvas to provide free-form anonymous feedback at any time during the semester. Your anonymous feedback will be used to improve the learning environment during the semester.

Academic Integrity

You are responsible to behave ethically and honestly. Copying, cheating, forgery, and other unethical or dishonest actions are not tolerated, will result in a zero grade, and may be reported to SSU authorities. For more information on SSU policy on academic cheating and plagiarism please refer to:

http://www.sonoma.edu/uaffairs/policies/cheating_plagiarism.htm

Classroom Learning Civility Clause

In any environment in which people gather to learn, it is essential that all members feel as free and safe as possible in their participation. To this end, it is expected that everyone in this course will be treated with mutual respect and civility, with an understanding that all of us (students, instructors, professors, guests, and teaching assistants) will be respectful and civil to one another in discussion, in action, in teaching, and in learning.

Should you feel our classroom interactions do not reflect an environment of civility and respect, you are encouraged to meet with your instructor during office hours to discuss your concern. For additional information and resources, please refer to SSU policy on civility and tolerance at:

https://www.sonoma.edu/about/diversity/civility-and-tolerance
Disability Support Services

Reasonable accommodations are available for students who have documented temporary or permanent disabilities. All accommodations must be approved through Disability Support Services located in Salazar Hall, Room 1049 in order to notify your instructor(s) as soon as possible regarding accommodation(s) needed for the course.

- Phone: (707) 664-2677
- Email: disability.services@sonoma.edu
- Web: http://www.sonoma.edu/dss/students/dss_services.html

For more information on SSU policy on disability access for students, please refer to: http://www.sonoma.edu/uaffairs/policies/disabilitypolicy.htm

Other Policies

Be sure you understand the policies that specifically affect you as a student of this course, such as:

- Add/Drop Policy: http://web.sonoma.edu/registration/#additional-reg-info
- Grade Appeal Policy: http://www.sonoma.edu/policies/grade-appeal-policy
### Class Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Tuesday</th>
<th>Thursday</th>
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</thead>
</table>
| 1. 01/21, 01/23 | Introduction / Overview  
Syllabus. Overview of topics and policies. | Essential knowledge quiz |
| 2. 01/28, 01/30 | Signals and Amplifiers (Ch. 1)  
Signals, frequency spectra, amplifier definitions | Signals and Amplifiers  
Amplifier circuit model, two-port networks |
| 3. 02/04, 02/06 | Operational Amplifiers (Ch. 2)  
Review, DC imperfections, finite gain | Operational Amplifiers  
Finite gain, bandwidth |
| 4. 02/11, 02/13 | Semiconductors (Ch. 3)  
Intrinsic and doped semiconductors, current flow | Semiconductors  
Current flow, pn junction, exam review |
| 5. 02/18, 02/20 | Mid-term Exam 1 | Semiconductors  
 pn junction, capacitive effects |
| 6. 02/25, 02/27 | Semiconductors  
Review | Diodes (Ch. 4)  
Ideal diodes, characteristics |
| 7. 03/03, 03/05 | Diodes  
Modeling | Diodes  
Modeling, operation |
| 8. 03/10, 03/12 | Diodes  
Diode circuits | Diodes  
Diode circuits |
| 9. 03/17, 03/19 | Spring Break – No Class | |
| 10. 03/24, 03/26 | Diodes  
Exam review | Mid-term Exam 2 |
| 11. 03/31, 04/02 | Cesar Chavez Day – No Class | MOS Field Effect Transistors (Ch. 5)  
Structure, physical operation |
| 12. 04/07, 04/09 | MOS Field Effect Transistors  
I-V characteristics | MOS Field Effect Transistors  
I-V characteristics |
| 13. 04/14, 04/16 | MOS Field Effect Transistors  
MOSFETs at DC | MOS Field Effect Transistors  
MOSFETs at DC |
| 14. 04/21, 04/23 | Bipolar Junction Transistors (Ch. 6)  
Structure, physical operation | Bipolar Junction Transistors  
Physical operation |
| 15. 04/28, 04/30 | Bipolar Junction Transistors  
I-V characteristics | Bipolar Junction Transistors  
I-V characteristics |
| 16. 05/05, 05/07 | Bipolar Junction Transistors  
BJTs at DC | Bipolar Junction Transistors  
BJTs at DC |
| 17. 05/12 | | Final Exam |

Note: schedules are subject to change.
ABET Requirements

Course Learning Objectives (CLOs)

By the end of this course, the student should be able to:

A. Understand principles of semiconductor materials and pn-junctions
B. Understand principles of practical op-amps, diodes, MOS transistors, bipolar junctions transistors
C. Characterize op-amps, diodes, MOS transistors, bipolar junctions transistors
D. Design, analyze, utilize circuits containing op-amps, diodes, and transistors
E. Calculate the gain and frequency response of amplifiers
F. Design amplifiers meet desired specifications

Student Learning Outcome

<table>
<thead>
<tr>
<th>ABET Students Outcomes</th>
<th>Assessed</th>
</tr>
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<tbody>
<tr>
<td>1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics</td>
<td>Y</td>
</tr>
<tr>
<td>2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors</td>
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<tr>
<td>3. an ability to communicate effectively with a range of audiences</td>
<td></td>
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<tr>
<td>4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts</td>
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<tr>
<td>5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives</td>
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<tr>
<td>6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions</td>
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<tr>
<td>7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies</td>
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</tbody>
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Assessment Methods

Assessment of student learning:

1. Examination (final exam)

Assessment of course quality:

1. Student survey and anonymous feedback
2. Student verbal and peer instructor feedback