Sonoma State University  
Department of Engineering Science  

EE 110 Introduction to Engineering Laboratory – Fall 2018

Units: 3.0 (laboratory)

Schedule/Location: T, 13:00–15:50 / Salazar 2003

Instructor: Mohamed Salem  
Office: Salazar 2010B  
Phone: (707) 664-3543  
Email: mohamed.salem@sonoma.edu (Please add [EE110] to email subject)  
Web: https://www.sonoma.edu/users/s/salemmo  
Hours: MR, 12:00–14:00; R, 16:00–17:00 (drop by/email – open door policy)

Prerequisites: None.

Description: This is the first course in electronics for electrical engineering majors and minors. The course is designed to introduce the basic principles of electrical engineering to the students and expose them to the electronics and computer laboratory environment. Students are given the opportunity to become familiar with the basic ideas of electronic components, actual and virtual test and measurement instruments, and some basic microcontroller basics. This course is also designed to provide an overview of some of the topics that the students will encounter in more advanced courses. The tools, components and parts purchased by students in this course will be useful for the duration of their electrical engineering studies.

Instruction Material: Posted on the course page.


Course Page: https://moodle.sonoma.edu/A/course/view.php?id=3455
Lab Material

Laptop Computer:

- Students are required to have a laptop computer for use in the lab and at home. Students will download drivers for some electronic instruments on their computers in the beginning of the semester.

Discovery Scope:

- Students can borrow a Digilent Discovery Scope (DS) from the department. A DS (about the size of a calculator) functions as a virtual set of test and measurement instruments including a power supply, a multimeter, a function generator and an oscilloscope. These units will be loaned to the students so they can perform parts of their experiments at home. Students are required to return the units to the department during the last laboratory session. Discovery scopes can be connected to the students’ desktop or laptop computers via a USB cable (provided). The PC or laptop provide power to the DS and function as a display. The details of software installation and use of the Discovery scopes will be given during the second laboratory session. In the event that a student loses or damages their device, they will be responsible for purchasing and returning a working unit back to the department.

Arduino Board and Components:

- Students must purchase an Arduino UNO R3 board (experiments 10 through 12). Students will also purchase parts containing a breadboard, electronic components and wires. Kits containing the board and parts can be purchased online for less than $50 (see the Arduino kit offered by Vilros: https://amzn.com/B00BT0NDB8 ). Since the breadboards included in the kits may be a little too small, students may choose to obtain larger breadboards separately.

Tools and Meters:

- Students should also purchase a multimeter (about $15 online); however, students pursuing a major in EE are strongly advised to invest in a high quality digital multimeter. Purchasing some basic tools (soldering iron, pliers, wire cutters, etc.) is optional. Information about tools and parts will be provided during the first session of the lab.

Lab Book:

- An inexpensive bound lab notebook with graph papers and page numbers. To get credit for your work each laboratory exercise must be signed by the instructor.

Text and Material Costs:

- The total estimated cost of the textbook, lab notebook, tools and supplies will be under $100. Students are encouraged to search online for best prices.
Course Policies

Attendance and Preparedness (graded):

- You are expected to be in class the entire class time. Please do not enter late or leave early, except due to an emergency or with an advance permission from the instructor.
- You must have all your relevant tools and material ready at the beginning of each lab.
- You are expected to actively participate in the class. You may not sleep, eat, drink or carry on side conversations in class. You may not work on assignments or study materials unrelated to the current class topic. You may not take pictures or audio or video recordings in class.

Lab Book and Reports (graded):

- Students must record the details of work (circuit diagrams, data and results) in the lab book.
- Students must turn in a total of four (4) complete laboratory reports (format will be described during the first two sessions). Reports are due at the beginning of the following lab session.
- Late reports handed on the same day incur 5% penalty, a day later 10% penalty, and each successive day 20% penalty.
- If a lab is missed without documented medical or family emergency excuse, 25% penalty incurs.

Final Project (graded):

- You are strongly advised to start planning for their final projects in mid-semester.
- Explore the internet and libraries to find interesting and practical applications relevant to laboratory topics.
- Project components and parts will be ordered after approval. The necessary electronic components and materials may be obtained from local or online electronic stores.
- Allow 1-2 weeks for delivery of project parts and components purchased online.
- Bring your “rough” project to class on Nov. 27 for demo and troubleshooting. Formal project presentations are scheduled for Dec. 04.

Assessment and Grading:

- No late work will be accepted after 17:00, Thursday, Dec. 06, 2018.
- Final grade is based on the weighting shown below

<table>
<thead>
<tr>
<th>Lab book</th>
<th>25%</th>
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<tbody>
<tr>
<td>Lab reports</td>
<td>25%</td>
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<tr>
<td>Attendance</td>
<td>25%</td>
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<tr>
<td>Final project</td>
<td>25%</td>
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Grade scale that will be used for total percentage points and corresponding letter grade are given below

<table>
<thead>
<tr>
<th>0</th>
<th>59</th>
<th>60</th>
<th>62</th>
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<th>90</th>
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<tr>
<td>F</td>
<td>D-</td>
<td>D</td>
<td>D+</td>
<td>C-</td>
<td>C</td>
<td>C+</td>
<td>B-</td>
<td>B</td>
<td>B+</td>
<td>A-</td>
<td>A</td>
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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/

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: http://www.sonoma.edu/students/civility_tolerance.pdf

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://www.sonoma.edu/catalog/08-10/17regulations.pdf#adddrop
- Grade Appeal Policy: http://www.sonoma.edu/uaffairs/policies/grade_appeal.htm
<table>
<thead>
<tr>
<th>Week</th>
<th>Experiment</th>
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| 1. 08/21 | Introduction and orientation  
Lab 00: Getting familiar with lab environment |
| 2. 08/28 | Lab 01: DC concepts and measurements [Standard lab equipment]  
Sign-up for “Discovery Scope” (DS). Download DS software. |
| 3. 09/04 | Lab 02: DC measurements I [Series, parallel, and combination of resistors] |
| 4. 09/11 | Lab 03: DC measurements II [Circuit laws and voltage dividers] |
| 5. 09/18 | Lab 04: AC concepts and measurements I [Standard lab equipment] |
| 6. 09/25 | Lab 05: AC concepts and measurements II [Introduction to capacitors] |
| 7. 10/02 | Lab 06: Introduction to rectifying diodes (lab report 1) |
| 8. 10/09 | Lab 07: Introduction to transistors (lab report 2) |
| 9. 10/16 | Lab 08: Introduction to operational-amplifiers (lab report 3) |
| 10. 10/23 | Lab 09: The 555 timer (lab report 4) |
| 11. 10/30 | Arduino basics. Setup, download and install software.  
Lab 10: Arduino sketch I |
| 12. 11/06 | Lab 11: Arduino sketch II  
Project title due. |
| 13. 11/13 | Lab 12: Arduino sketch III  
Project proposal with title and description due. Order parts! |
| 14. 11/20 | Project preparation  
Makeup lab |
| 15. 11/27 | Project discussion  
Makeup lab |
| 16. 12/04 | Project presentation |

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. learn basic electronic concepts, breadboard and electronic components, and writing lab reports
B. learn to use traditional laboratory equipment, including power supplies, function generators and oscilloscopes
C. simulate traditional test and measurement instruments using digital instruments connected to students’ laptops
D. learn some basic input/output experiments using microcontrollers
E. learn about project design, including cost, timetable, construction, and operation of circuits

Student Learning Outcome versus Course Learning Objectives

<table>
<thead>
<tr>
<th>ABET Students Outcomes</th>
<th>CLOs</th>
<th>Level of Support</th>
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</thead>
<tbody>
<tr>
<td>(a) an ability to apply knowledge of mathematics, science, and engineering</td>
<td>0</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>B, C</td>
<td>4</td>
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<tr>
<td>(c) an ability to design a system, component, or process to meet desired needs</td>
<td>E</td>
<td>4</td>
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<tr>
<td>(d) an ability to function on multi-disciplinary teams</td>
<td>0</td>
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<tr>
<td>(e) an ability to identify, formulate, and solve engineering problems</td>
<td>0</td>
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<tr>
<td>(f) an understanding of professional and ethical responsibility</td>
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<tr>
<td>(g) an ability to communicate effectively</td>
<td>A</td>
<td>2</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>0</td>
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<tr>
<td>(i) a recognition of the need for, and an ability to engage in life-long learning</td>
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<td>(j) a knowledge of contemporary issues</td>
<td>0</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>B-E</td>
<td>2</td>
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</tbody>
</table>

Level of support (0-5): 0=No support, 1=Lowest support, 5=Highest support

Assessment Methods

Assessment of student learning:

1. Lab book and lab reports
2. Project demonstration

Assessment of course quality:

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