ENGR 40M: Intro to Making (What is EE?)

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1 Class Overview

1.1 Class Intro

This class is a hands-on class where we'll learn the abilities that allow us to build projects like a solar panel-powered phone charger and an EKG that measures your heart rate. Through this process of building, you are introduced to the basic areas of EE like circuitry, signal processing, and some digital logic basics. We'll also build a "useless box" and learn feedback, and programming hardware. We also build an 8x8 LED display that you can program games like "Snake" or "Metroid" onto– or simply program to display anything else you want! And you get to keep the toys you build. Prerequisite: CS 106a (or equivalent).

Class will be MWF 11:30am-12:30pm in 160-124.

1.2 We are here to help

Issues come up all the time in the busy quarter (whether illness or other personal reasons) Please reach out to Marc (huerta23@stanford.edu) if you need extra help or support!

1.3 Course Reader

Reading the course reader is not mandatory, but it is a great resource for understanding more fast-paced or confusing lecture topics, as well as for finding additional practice problems.

It's one of my personal favorite resources for the class, and an underrated (according to other previous classes) place to learn course material from. It goes a bit more in-depth on topics than we have time to get into in the class but provides more context on topics. Also provides the same solid foundation we do in class with the lectures and videos but in an alternate textbook-like form that may help some concepts click if you are struggling to understand them from lectures, videos, or office hours.

Located on Canvas under: Files – Reader.

HIGHLY recommend.

2 Class Logistics

2.1 Labs Kits

All labs will be in-person, in our lab in Packard 051. Each of you will be getting a lab kit that contains the parts you will need for the quarter. The kits cost around $100, so please don't lose yours. We will start distributing lab kits the beginning of the 2nd week of class. Labs will begin during week 2.

2.2 Labs Sign Up

Each of you will sign up for a 3-hour lab period. The lab timing will be spread throughout the week and we'll do our best to accommodate schedules. Lab sign-ups will open on Thursday June 27th at 12pm PT via Canvas. Labs will be capped at 12 students per section and it will be first-come-first serve for times. Because of that, if you need particular times, please be sure to sign up ASAP. To sign up, please go to People/Labs. Lab times and logistics (including action items for you to request building access) are available here: Lab Logistics

2.3 Lab Logistics

Prelabs The purpose of the prelab is to lay the groundwork for what you'll be doing in lab. In our experience, students who come to lab without having done the prelab work have a much harder time and end up spending longer in the lab as a result. For this reason, the prelabs must be submitted at least 24 hours before you come to lab.

The course moves at a rapid pace, so you'll often be doing the prelab right after seeing the material for the first time in class. It's normal and completely acceptable to be confused at times, but make sure you get help so that you can make the most efficient use of your time in the lab.

Lab Access Please complete the following tutorials and associated quizzes. When you are finished screenshot the last page and send it to your lab TA.

a) Basic Lab Safety Training
b) Introduction to Soldering

2.4 Lectures

We run this class in a flipped format. The traditional class lectures have been broken into a number of short video segments, each focusing on one concept. The material is also presented in a reader, so you can either read the reader, watch the videos, or do both. To make sure you are tracking the class material in real time, after reading/watching the lecture material, you must complete the Canvas exercise to check your understanding of the concept.

In class time (MWF 11:30am-12:30pm in 160-124) will consist of two segments. The first 15ish mins will be answering questions you have about the lecture material. The rest of the time will be spent working with each other (and the teaching staff) to solve problems. We will tackle a different group of problems each day:

Monday: A worksheet with former exam problems to help practice the material and prepare for exams.

Wednesday: The current week's homework.

Friday: The following week's prelab.

You will work on these problems with fellow students. Marcs and the TA will be there to help and answer questions. Showing up to class is the best way to learn the material and it is highly encouraged. Please show up for the first day of class!

2.5   Weekly Overview

1. Work through the lecture material via the Modules Tab.

2. Attend class (3x/week)(MWF 11:30 pm PT)

3. Attend your lab section (1x/week)

4. Turn in weekly homework (Due Fridays at 11:59pm on gradescope)

3   Grades and Late Policy

3.1   Grade Breakdown

Lab : 45% This course is as much about learning to construct and debug real things as it is about learning to analyze circuits, so the majority of your grade is based on your work in lab. It is a lab based class. Your grade in lab has many components. 33% of your lab grade is your prelab. This part of the assignment is due one day before your lab. The prelab walks your through the reasoning part of the lab so you can be efficient in the lab.

The other 67% is how well you completed the lab, including how you leave your lab station after each lab. Make sure that all your tools are back where you found them, and you have cleaned up the station for the next student. Labs are graded both for function and build quality. Function points are based on completing the prelab, getting reasonable answers for the lab measurements and performing correct analysis, and for having a working project. Build quality points are based on the quality of your physical construction and code. Quality isn't aesthetic: well-built circuits are more robust and easier to debug, and well-written code is much easier to understand when you come back to it two months later. More details are in the lab procedures handout.

Problem Sets : 15% The problem set is where you'll drive home the concepts from lecture. While it's numerically a small part of your total grade, understanding the homework is the best way to prepare for the exams. We will consider all problem set scores; however, given that each problem set is worth about 2% of the grade, dropping one score should not make a significant impact on the overall grade.

Exams : 40% There are 2 exams: one at the end of week 5 (Friday, July 26) and one at the end of the quarter (TBD). There will be no class on the Friday of the Midterm. The Midterm is worth 18% and will run 90 minutes starting at class time. The final is 22% of your total grade. It only explicitly covers second half material, but this is inherently cumulative as completing these problems requires understanding of first half material. The final will be 2 hours long). Location TBD

3.2   Late Policy

Our late policy is simple. Every student is given three late days. Using a late day works as follows: one late day extends the deadline to Saturday 11:59PM, two late days extends the deadline to Sunday 11:59PM. Once late days are used up, there will be a grace period until Sunday 11:59PM with 50% off. After that, the grade will be a 0.

The only exception is prelabs, which are always due 24 hours before your lab time. We don't allow late prelabs since it is work we want you to do before coming to the lab. We also review the prelab every Friday in class to help you understand that material.

If you find yourself in an exceptional situation, please reach out to either Marc or your lab TA a significant amount of time BEFORE assignment deadlines.

4   Before and After Classes/Labs

4.1   Before Class

- Watch the videos.

- Do the Canvas Exercises.

4.2   Before Your Lab Period

- Read the entire lab handout.

- Complete the prelab in the lab handout (due 24 hr before lab time on Gradescope).

4.3   During/After Lab

- Complete the lab following the handout. The construction guides are useful tool as well.

- Complete all measurements and questions in lab handout (due on Gradescope 6 days after lab, i.e., 24 hours before next lab)

- Present completed lab to TA in person or via video for completion and build quality grade (due 24h before the following lab)

5   Quarter Overview

5.1   Weekly Release/Due Schedule for Labs and PSets

Week	Dates	Lab	Problem Set Release Date	Problem Set Due Date (11:59pm)
Week 1	Jun 24-28	–	PSET 1: Jun 21	————————
Week 2	Jul 1-5	Lab 1 (Solar)	PSET 2: Jun 28	PSET 1: Jun 28
Week 3	Jul 8-12	Lab 2A (Useless Box)	PSET 3: Jul 5	PSET 2: Jul 4
Week 4	Jul 15-19	Lab 2B (Useless Box)	PSET 4: Jul 12 - (will be short)	PSET 3: Jul 12
Week 5	Jul 22-26	Midterm: –Jul 19– (NO LAB)	PSET 5: Jul 19 - (will be short)	PSET 4: Jul 17
Week 6	Jul 29-Aug 2	Lab 3A (LED Board)	PSET 6: Jul 26	PSET 6: Jul 26
Week 7	Aug 5-9	Lab 3B (DiY Game)	PSET 7: Aug 2	PSET 6: Aug 2
Week 8	Aug 12-15	Lab 4 (EKG)	————————	PSET 7: Aug 9

5.2   Midterm / Final

- TBD 2-hour test

6   Class Resources

6.1   Teaching Staf

Lecturer: Marc Huerta (huerta23@stanford.edu)

6.2   Office Hours

Office hours begin week 2.

Office hours will be held in TBA. There will also be lab office hours in Packard 051 dedicated to helping students finish labs.

- Lab OH: TBD

- HW OH: TBD

6.3   Arduino Guide

Refer to Canvas section on homepage and scroll down to "Arduino Guide".

6.4   Soldering Tutorials

Once again, refer to the Canvas homepage and scroll down to "Soldering Tutorials" for some awesome references and guides.