ECE110: Semester Overview

There are 14 weekly laboratory meetings during this semester. The first lab meets for Experiment 1 **the first full week of classes**. The final lab meets to demo projects during the final "full" week. A shift of Monday to the end of the 7-day week occurs due to Labor Day/Martin Luther King holiday.

A pre-lab exercise must be completed before coming to lab. At each laboratory meeting, you will join your classmates in the small lecture room (1005 ECEB) adjacent to the ECE110 lab for instruction where your prelab will be assessed.

The first nine laboratory exercises are highly-structured, cookbook-style labs where you are strongly guided by the procedure and explicit questions. These core labs are augmented with ***Learn More!*** **Laboratory Modules** which extend your understanding of the material and/or provide timely resources for moving forward to future labs. Some of these modules will be explicitly required (you must do them during the course of the semester) and others are optional. You will be required to earn at least 40 points (tentative…TAs will confirm if this value is correct) from these modules for full credit in the lab.

The tenth laboratory exercise is partially-guided. It serves as an introduction to design and will aid you when you begin to structure your own independent lab report for the final project.

The last four laboratory meetings are design-based where each lab group will design, build, and demonstrate an electronic device to accomplish a task provided by the lab instructor. In this "project-phase" of the course, you are required to utilize the skills developed in your earlier lab meetings to produce a written report.

While the focus of each individual lab appears to explore individual concepts in hardware, circuit theory, and the construction of an autonomous vehicle, the complete set of lab procedures are designed to help you build a skill set in engineering exploration that will serve you well both in this class and throughout your engineering career.

A short, tentative breakdown of your semester laboratory exercises are provided in the table below.

Notes:

Labs (Subject to Change):

1. A Lab Course Introduction
   - Build a robotic car, build a circuit, record data
2. DC Circuits and Tools
   - Benchtop hardware
3. Gaining skills through Exploration
   - A partially-guided exploration of the lab, equipment, and concepts in EE.
4. Validating Kirchhoff's Laws using a Breadboard
   - Simple measurements to affirm circuit laws
5. Time-Varying Circuits
   - PWM generation and tools to measure time-varying signals
6. The Oscillator Circuit
   - Building and testing of a time-varying circuit.
7. Motors and Batteries
   - Characterization of devices
8. Semiconductor Devices
   - First look at diode/BJT, **Final Project Guidelines**
9. Pulse Wave Modulation
   - Efficient motor drive, **Project Brainstorming**
10. Navigation
    - VDR feedback for control, **Project Brainstorming**
11. **The Project Proposal (Due!)**
    - Step-by-step proposal of the task
12. **Proposal Review and Project Progression**
    - Review comments, revise, and begin
13. **Project Progression**
    - Continue and finish
14. **Project Presentations**
    - Presentation by schedule and report due

Notes:

A little about the Final Project

The key to doing well on the final project is to learn the mechanics of experimentation in electronics. The early labs will prepare you. You will need to be able to

- Characterize a sensor you have never seen before by collecting circuit data.
- Analyze your data using a graph and use that analysis to model its behavior.
- Show proficiency with the equipment used to collect/analyze data.
- Characterize an actuator, perhaps a motor or a loudspeaker.
- Analyze your data using a graph and use that analysis to model its behavior.
- Properly bias that sensor and utilize it in a broader design in a control loop to affect the output in a manner that completes a pre-defined task.
- Properly document your procedure, data, observations, summary and conclusions in a well-written report.

Students commonly form a strong misconception about this course and the requirements of the final design project. ECE110 is **not a programming course**. Rather, it provides limited exposure to some scientific computing basics (using MATLAB to plot and model) and some physical computing basics (using Arduino as a measurement device and a digital controller). Only plotting (graphing) is a requirement in the final project. Other use of physical computing in the final project is purely up to the student team as most projects do not necessitate the use of a digital controller.