

## **ESE 123 Syllabus for Spring 2011**

### **Objectives:**

ESE123 is an introductory course intended to introduce students to basic electrical engineering concepts, equipment usage, and laboratory procedures. Our primary interest will be in developing familiarity with the basic tools of the working engineer: test equipment, simulation software, and basic prototyping techniques. You still have another three years to fill in the details. We will not cover topics in great mathematical depth, but we will cover a vast breadth of material.

You will get to experience the thrill and challenge of building a working circuit, as well as the despair of report writing. We will discuss engineering careers, and we will try to answer the most important question of the course: will you enjoy an engineering career?

There is no text for the class, but you will be required to buy a parts kit for our laboratory project. The price for the kit depends on the number of students in the class, and may be as high as \$50.

### **Topics:**

The course will be presented in three main sections as outlined below. Within each section multiple sub topics will be explored:

- Use of laboratory equipment and basic circuit theory
  - Electrical units (volt, amp, ohm, watt, coulomb, hertz)
  - Conductors, insulators, and semiconductors
  - Laboratory safety and procedures
  - Ohm's law
  - Series and parallel connections
  - Power dissipation in a resistor
  - Kirchoff's voltage and current laws
  - Soldering and prototyping
  - Circuit simulation software
- Construction and evaluation of a USB power supply
  - Linear USB power supply
    - Reading specifications
    - Transformers
    - Capacitors
    - Diodes and bridge rectifiers
    - Transistors
    - Linear regulators
    - Current limiters
    - Heat sinking
  - Switch mode power supply
    - Power supply efficiency
    - Efficiency impacts on power supply cost and size
    - Basic buck converter topology

- Construction of digital clock
  - Digital logic levels
  - Digital representation of numbers
  - Display drivers
  - Microcontrollers
  - Assembly programming

### **Laboratory work:**

Modern engineering is very much a team activity, and you will be working in the laboratory in groups of two. Each laboratory assignment consists of a prelab assignment that must be completed *before* the laboratory section begins and a laboratory procedure that will be followed during the lab. The lab procedure will be made available on blackboard and must be brought to the laboratory as the lab computers are not connected to the internet. A USB flash drive will be useful to record your results.

Each student will be required to present a completed prelab assignment to their teaching assistants (TAs) at the beginning of the laboratory section. After the completion of the lab, the lab group will work together to answer the questions presented in the laboratory procedure. The prelab assignment and answered questions will be submitted to the TAs at the end of the laboratory section for grading.

Written communication is an essential part of the engineering profession. Each student will be required to prepare two written laboratory reports, one for the power supplies we construct and one for the microcontroller-based clock. The laboratory reports will briefly summarize the activities and results of the lab work. A report guideline will be posted on blackboard.

The laboratory sections will begin meeting on Monday February 14<sup>th</sup>.

### **Exams:**

There will be two midterm exams in addition to the final exam. We will have an exam after the completion of each major section of the course. The midterm exams will be held in our regular classroom during our regular class time. The final will be held on Wednesday May 18<sup>th</sup>, from 5:15 to 7:45 in our regular room.

There is no text for this course. The materials you require will be posted on Blackboard.

### **Portfolio:**

To satisfy the requirements of our ABET accreditors, you will need to submit a portfolio for this course. The portfolio should contain copies all of your lab work, papers, and exams.

**Grading:**

The grading will be broken down as follows:

Weekly laboratory assignments:	30%
Laboratory reports:	15%
Midterm 1	15%
Midterm 2	15%
Final exam:	20%
Portfolio	5%

**Schedule:**

The lecture meets Monday and Wednesday from 5:20 to 6:45 in Harriman 116.

All laboratory sections meet in Light Engineering room 283. The laboratory sections will start meeting on 14 February.

My office hours will be held on Monday from 12:45 to 3:45 p.m. and on Thursday from noon to 2 p.m. in Light Engineering 215. I will be happy to meet with students at other times by appointment.

Each of the Teaching Assistants will also hold office hours that will be posted.

**Contact Information:** David Westerfeld x21358, [davidwesterfeld@ieee.org](mailto:davidwesterfeld@ieee.org),

**NOTES:** If you have a physical, psychological, medical or learning disability that may impact on your ability to carry out assigned course work, we urge you to contact the staff in the Disabled Student Services office (DSS). DSS will review your concerns and determine, with you, what accommodations are necessary and appropriate. All information and documentation of disability is confidential.

Academic dishonesty is a serious matter and will be reported to the Judiciary Committee.