ESE 123 Syllabus for fall 2023

Objectives:

ESE123 is an introductory course intended to introduce students to basic electrical engineering concepts, equipment usage, circuit assembly, 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 circuit construction. You have another seven semesters to fill in the details. We will not cover topics in 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 code that doesn't work. The class is centered on building and programing a microcontroller based smart USB charger with an integrated digital clock. 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.

Course Learning Outcomes: After completing this course, you should be able to:
1. Analyze simple circuits
2. Demonstrate proficiency in the use of electrical test equipment
3. Demonstrate circuit assembly techniques
4. Utilize computer automated design (CAD) tools to model circuits
5. Describe how example circuits work and calculate component values
6. Perform some basic embedded system programming

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
    - Use of lab power supply, digital multimeter, function generator, and oscilloscope
    - 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 smart USB power supply
    - Operational amplifiers
    - Current sense amplifiers
    - Field effect transistors as switches

- Construction and programming of a digital clock
  - Digital logic levels
  - Digital representation of numbers
  - Microcontrollers
  - Elements of C programming
  - Display multiplexing
  - Pushbutton interfaces

Laboratory work:

Modern engineering is very much a team activity, and you will be working in the laboratory in groups of two. Most 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 Brightspace. A USB flash drive may be useful to record your results.

After the completion of the lab, the lab group will answer the questions presented in the laboratory procedure. The prelab assignments and answers to the lab questions will be submitted via Brightspace for grading.

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-person in our regular classroom during our regular class time and will be delivered via brightspace. You will need a working device to connect to brightspace. The final exam will be held in our regular room on Tuesday December 18th from 5:30 pm to 8:00 pm.

Course materials and lecture videos will be posted on brightspace.

Grading:

The grading will be broken down as follows:

Weekly laboratory assignments:	45%
Midterm 1	15%
Midterm 2	15%
Final exam:	25%

Schedule:

The lecture meets from 5:30 pm to 6:50 pm on Mondays and Wednesdays in Frey Hall 102.

The laboratories will be conducted in Light Engineering room 283. The laboratory sections will begin meeting on September 11th.

My office hours will be on Tuesday from 10:00 am until 11:30 mm and on Wednesday from 7:00 pm until 8:30 pm in Light Engineering 143. 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 on blackboard.

Lab schedule

Week	Lab topic
1	No labs this week
2	No labs this week
3	DC power and ohm's law
4	DMM
5	SPICE and soldering
6	Function generator and oscilloscope
7	Capacitors and oscilloscope 2
8	Operational amplifier
9	Buzzer (assembly)
10	SOS (C compiler)
11	Stopwatch
12	Oscillators
13	Clock
14	Analog to digital converter

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The University Senate Undergraduate and Graduate Councils have authorized that the following required statements appear in all teaching syllabi (graduate and undergraduate courses) on the Stony Brook Campus.

Americans with Disabilities Act: Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and the Student Accessibility Support Center. For procedures and information go to the following website: https://ehs.stonybrook.edu//programs/fire-safety/emergency-evacuation/evacuation-guide-disabilities and search Fire Safety and Evacuation and Disabilities.

Academic Integrity: Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Professions, Nursing, Social Welfare, Dental

Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty please refer to the academic judiciary website at http://www.stonybrook.edu/commcms/academic_integrity/index.html

Critical Incident Management: Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Student Conduct and Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.

Document created by David Westerfeld 28 August 2023.