

## **ESE 123 Syllabus for fall 2025**

### **Objectives:**

ESE123 is an introductory course intended to introduce students to basic electrical engineering concepts, test equipment usage, circuit assembly, programming, and laboratory procedures. Our primary interest will be in developing familiarity with the basic tools of the working engineer: test equipment, simulation software, coding, and 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 programming 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: is an engineering career right for you?

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 basic 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
  - Kirchhoff'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
  - Assembly language programming
  - 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 pre-lab assignment that must be completed before the laboratory section begins and a laboratory procedure that will be followed during the lab.

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.

### **Lecture & quizzes:**

Lecture attendance is required. The lectures will be recorded on Echo360 and made available on Brightspace for later review or if you miss a class. The lectures will not be live streamed. There will be occasional in-class quizzes during the semester. The lowest quiz score will be dropped.

### **Exams:**

There will be a midterm exam and a final exam. The midterm exam will be held in-person in our regular classroom during our regular class time and will be delivered via brightspace. The date of the midterm is tentatively on October 15th. You will need a charged device to connect to brightspace. The final exam will be held in our regular room on December 10<sup>th</sup> from 5:00 pm to 18:00 pm.

All course materials and will be posted on brightspace.

### **Grading:**

The grading will be broken down as follows:

Weekly laboratory assignments:	40%
Quizzes:	10%
Midterm 1	20%
Final exam:	30%

### **Schedule:**

The lecture meets from 5:00 pm to 6:50 pm on Mondays and Wednesdays in Frey 100.

The laboratories will be conducted in Light Engineering room 283. The laboratory sections will begin meeting on September 9<sup>th</sup>.

The final exam will be on 10 December 2025 in our regular room from 5:30 pm to 8:00 pm.

My office hours are on Wednesday from 6:30 PM until 8:00 PM and on Thursday from 6:30 PM until 8:00 PM in Light Engineering 143. I will be happy to meet at other times by appointment.

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

Week	Starting date	Monday lecture	Tuesday labs	Wednesday labs	Wednesday lecture	Thursday labs
1	August 25, 2025	Intro, units	No lab	No lab	Ground resistors	No lab
2	September 1, 2025	No class	No lab	No lab	Derating, labs, power supply	No lab
3	September 8, 2025	KVL, KCL #1	DC power and ohm's law	DC power and ohm's law	KVL, KCL #2	DC power and ohm's law
4	September 15, 2025	DMM	Dmm	Dmm	Circuit analysis	Dmm
5	September 22, 2025	soldering	SPICE and soldering	SPICE and soldering	AC signals	SPICE and soldering
6	September 29, 2025	Oscilloscope and ARB	Function generator and scope #1	Function generator and scope #1	capacitors	Function generator and scope #1
7	October 6, 2025	Op amp	Capacitors and scope #2	Capacitors and scope #2	Project description	Capacitors and scope #2
8	October 13, 2025	No class	No lab	Op amps	Midterm exam	Op amps
9	October 20, 2025	Digital and microcontroller	Op amps	Assembly buzzer	Digital math	Assembly buzzer
10	October 27, 2025	Ports and C	Assembly buzzer	SOS	Static and SOS	SOS
11	November 3, 2025	Switches, prototyping	SOS	Stopwatch	Multiplex, transistors	Stopwatch
12	November 10, 2025	Timing	Stopwatch	Clock	Analog to digital	Clock
13	November 17, 2025	USB specification	Clock	Analog to digital converter	USB charging	Analog to digital converter
14	November 24, 2025	Electrical safety	Analog to digital converter	No lab	Curriculum	No lab
15	December 1, 2025	Moore's law	USB-C charging and final assembly	USB-C charging and final assembly	Final review	USB-C charging and final assembly
16	December 8, 2025	Class visitor				
17	December 10, 2025				Final exam 5:30 to 8:00 pm	

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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](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 24 August 2025.