6.101 is an introductory electronics laboratory. You will learn about the basic principles of analog circuit design and operation in a practical, real-world laboratory setting. You will work both with discrete components such as resistors, capacitors, diodes, and transistors as well as with integrated components such as operational amplifiers both with through hole parts as well as surface mount parts. In addition, you will become familiar with the operation of basic electronic test equipment (digital multimeters, oscilloscopes, function generators, curve tracers, etc.). There are six labs due weekly which start out as cookbook types and progress to design exercises; there are group design projects for the second half of the term.

1. LAB KITS
Get a locker with the lab kit. The lockers are located on the sixth floor outside the 6.101 lab.

2. Your account will be charged $3550.00 if your lab kit is not returned by the due date at the end of the semester. A late fee of $25.00 will be retained when your kit is finally returned. Your account will also be charged directly for books borrowed and not returned.

3. LABS
During the initial part of the course (the first half of the semester), you will perform and turn in six laboratory experiments. They start out as fairly simple “cook-book” experiments and progress into design exercises. Labs should be checked off as required. These labs will be handed out in class on Thursday, and the write-ups will be due at 2:30 pm in class on Thursday of the following week. **NOTE: you should expect that these laboratory assignments will take you on the order of 9 hours a week, on average. You will find it very difficult to finish them properly unless you start them early and plan on devoting a significant amount of time to them. The first lab is a longest one of all the labs.**

Although you should feel free to discuss your work with your fellow students and of course the staff of 6.101, **you are expected to work individually on each laboratory and the work which appears in your lab write-ups should be your own.**

4. PROJECT
During the last half of the semester, you will be working on a design project. The class will be broken into teams of 2 or 3 persons, and each team will decide on a project. This project must be conceived in terms of a “product” that your team will design, with a set of overall objectives and especially with a set of minimum specifications which it must meet. Each team will then compete to design the best product (most elegant design, best performance, most closely meets specifications, most intuitively operated, lowest parts count and parts cost, etc.). Suggested projects will be presented in class later in the term.
[IMPORTANT: This is an analog course so your project should be analog in nature. Your project grade will be based on the analog component. We do recognize that some use of digital circuits such as display or control logic may be necessary. Consult with the staff when using digital systems. You should not use dedicated “chips” such as National’s “AM-radio-on-a-chip” that require little understanding of the circuit operation to use. We want to teach you to learn to design things using the basic building blocks: op-amps, FET switches, current mirrors, discretes, etc. We want to train you so you can go to work for Linear Technology or Analog Devices or Silicon Labs and design sophisticated chips!]

The objective of the design project is to simulate the process of system design as it might occur in a “real-world” manufacturing environment. You can think of your team as working for a company who has identified a product in which consumers are interested. Your team will have to develop an implementation strategy, design the required circuitry, debug it and achieve a final implementation, complete with documentation. This will give you a chance to deal with real-world design issues: what are the trade-offs involved in choosing a design, how does one select specific parts, how much power will the circuit draw and how do you design a suitable power supply, how should the circuit be laid out, packaged, etc.? Your final report will consist not only of a description of your circuit and how it operates but also a detailed description of the design process you followed.

The department provides a limited budget [roughly $100 per project] to fund your project. In addition to using parts from your lab kits and the stockroom, you will be able to purchase additional components as needed to complete your design. The details of how much each team will have to spend and the process for purchasing parts will be announced later in the semester.

For your design project you will be expected to keep a complete record of your work (circuit ideas, calculations, results of your measurements and experiments, etc.) in a laboratory notebook. In addition to being good practice, your notebook will provide an accurate record of the various stages of your project to which you and your teammates will need to refer as you write the final report describing your project. At the end of the semester, we will collect your laboratory notebooks and will review your notebook as a record of your work in 6.101 and will consider it when evaluating your performance in the course.

During the second half of the term, your lab time will be devoted to your design project. You will make an initial team oral presentation at the beginning of the project period, to the teaching and the writing office staff, and a final oral presentation/demonstration at the end of the term to the teaching staff, and you will also turn in a written report at that time. Hand drawings and schematic are not acceptable.

The initial and final oral presentations and the written report for the design project will be a team effort. These are also part of the requirement for the CI-M writing credit.

Your group will also meet with the instructing staff on approximately a bi-weekly basis to discuss your block diagrams, circuit schematics, etc. so that we may monitor your progress, much as engineering design reviews in industry are conducted. Part of this monitoring procedure includes a checkoff of the operation of your basic circuitry.
USING YOUR 6.101 PROJECT & PAPER TO SATISFY YOUR CI-M REQUIREMENT

- 6.101 is a CI-M class. Your paper must satisfy the CI-M requirements, you must clearly identify your contribution to the group paper, and you must turn your draft paper in a few days before your project is due so that the writing office staff will have time to make corrections to the paper so that you will have time to revise it before the last day of classes.

- In addition, students will be required to make an oral presentation to the class at the start of the project period, and their final oral project presentations are also part of the CI-M requirement.

- The CIM instructor will address the class on how to write your paper, and the 6.101 staff will also give you information later in the term on what we require of your paper.

- Figures and schematics must be drawn electronically – the same when you submit a paper for publication.

5. TEXTBOOKS

REFERENCES