

+ **ECE137AB Circuits and Electronics**

This 2-quarter sequence has 2 components. We spend about 75% of our time in a design-oriented coverage of transistor analog electronics. The remaining time is spent covering transient and frequency- response of RLC networks. We also will try to cover lots of feedback, filter, and linear systems theory so as to complement ECE130ABC.

- **Prerequisites**

ECE 2A, 2B, 2C Circuits and Electronics

ECE132 Semiconductor Device Physics

ECE130A

ECE137A is a prerequisite for ECE137B (of course)

If you have received a C- or below in any of these courses, or have a GPA below 2.0, you should arrange to see the instructor immediately

- **Texts:**

Recommended, not required: Microelectronic Circuit Design, Second Edition, R.C. Jaeger and T.N. Blalock. You could also use any recent version of Grey and Meyer, Analysis and Design of Analog Integrated Circuits. Also, please keep your Sophomore circuits text, as you will need that to review both nodal analysis and the frequency/transient response of RLC circuits. Similarly, the course will use Fourier and LaPlace transforms, hence it is advisable to retain your ECE130ABC text.

Lecture notes are available on the course web page.

Laboratory:

Do not go to the lab at the times posted in the Schedule of classes

Design projects, not set experiments, will be assigned as the lab content of the course. The labs will be open, and you are free to work on your projects whenever the lab has open hours. The lab design projects are highly independent in nature, and your work should be creative, independent, original, and analytically rigorous. You will make a appointment at a specified time to check off the lab project in the presence of the TA. The lab is closed to further lab construction or project debugging during these times. The project must be working and available for check off at the time of the appointment; it is otherwise graded as late with associated penalties. Upon check-off, the circuit is handed in to the TA, and the TA in return provides a signed check-off sheet of recorded measurement values to each design team. This check off sheet is then included by the students as a part of the design report, due usually 1-3 days after the check off period.

Design teams are groups of two students. Larger groups are not permitted.

There are no parts boxes in the lab. Parts for the lab can be obtained from the electronics shop on the 1st floor of engineering. Since they are not open evenings or weekends, reasonable advanced planning is required in terms of purchasing parts.

Things you should purchase, one set-up per group of students:

A tool and part box (Tackle box or Tupperware), Wire stripper and pliers , Solder less bread board, Soldering Iron (20-30 Watts), and solder, soldering heat sink clips, a small sponge (cleaning the iron tip), Vector board (perforated circuit board), a set of test leads for the digital voltmeter, 2 oscilloscope cables, and "flea clips"-insertable soldering terminals for vectorboard (optional, makes circuit construction easier and neater). While these items can be bought at Radio Shack or Dow/Marvak, the electronics shop on the 1st floor of engineering 1 will generally be much more economical. For desoldering, please consider acquiring desoldering wick. ***"Solder-sucker" desoldering tools are not permitted in the lab, as they disperse a toxic dust of solder granules over the lab.***

Homework Assignments

Homework sets will be due, at the times posted on the web, in the homework boxes in the center stairwell on the 5th floor of engineering 1. Late homework cannot be accepted as it interferes with the need to post solutions and return graded homework assignments quickly. Solutions will be posted on the library's web page soon after the due date. About 20% of the problems will be graded in detail, with the remainder graded correct/incorrect.

Copying work and other honesty issues

You are expected to work independently on both your problem sets and your lab projects. Significant sharing of design details on the lab projects is a violation of academic standards. Students are expected to keep their eyes on their own exams: students may expect to receive an exam grade of zero if they are observed to be looking at other student's examination papers.

Grading (approximate)

Lab 25%
Problem Sets 10%
Mid-term 25%
Final 40%

Exams

Mid-term and final exams will be closed book. 2-Page amplifier crib sheet allowed on both mid-term and final. 2 Pages of student notes allowed on mid-term, 3 pages of student notes for the final.

- + Course Agenda 137A
- + Transistor Electronics at Mid-Band: 5 Weeks
 - BJT and FET characteristics:
 - Single-Stage Amplifiers:
 - Multistage Amplifiers, Analog ICs:
- + Transient Analysis: 5 Weeks (may spill into 137B)
 - Time-domain response of 1st-order Circuits
 - Time-domain response of 2nd-order circuits

- LaPlace (frequency-domain) analysis
- circuit impulse and frequency responses
- + Course Agenda 137B
- Transistor circuit high-frequency response:
- Feedback Circuits and stability:
- Feedback Amplifiers: