

UNIVERSITY OF CALIFORNIA
College of Engineering
Department of Electrical Engineering and Computer Sciences

EE 130: INTEGRATED CIRCUIT DEVICES

<http://www-inst.eecs.berkeley.edu/~ee130>

Spring 2007

Prof. Liu

Course Information Sheet

Staff: Professor: Tsu-Jae King Liu (tking@eecs.berkeley.edu, 643-9251)
Teaching Assistants: Frank Liao (fliao@eecs.berkeley.edu)
Alvaro Padilla (apadilla@eecs.berkeley.edu)

Lectures (289 Cory): Mondays, Wednesdays, and Fridays 1 PM to 2PM

Discussion Sections (beginning on Friday 1/19):

Section 101 (521 Cory): Wednesdays, 9-10 AM; Frank Liao

Section 102 (531 Cory): Fridays, 2-3 PM; Frank Liao

Students are encouraged to ask relevant questions in class, and to regularly attend a discussion section. The TA's will review important concepts covered in the lectures and work through sample problems during the discussion sections.

Office Hours:

T.-J. King Liu (567 Cory): Wednesdays 2-4 PM

F. Liao (382 Cory): Mondays 9-10 AM and Thursdays 4-5 PM

A. Padilla (382 Cory): Fridays 4-5 PM

Objective:

To teach the fundamentals of basic semiconductor devices: the pn-junction diode, the bipolar junction transistor, the metal-oxide-semiconductor capacitor, and the field-effect transistor. Upon completing this course, the student will understand their principles of operation, and how their electrical characteristics depend on their physical parameters and operating conditions.

Prerequisites:

- EECS 40: Simple pn-junction diode and MOSFET theory; MOSFET circuit applications.
- It is assumed that students are familiar with the Bohr model (concept of electron energy levels) for the hydrogen atom.

Relation to Other Courses:

EE130 is a prerequisite for EE231 (Solid State Devices). It is also helpful (but not required) for IC analysis and design courses such as EE140 & EE141, as well as for the microfabrication technology course EE143.

Textbook: *Semiconductor Device Fundamentals*, by Robert F. Pierret

References (on reserve in the Engineering Library):

1. *Solid State Electronic Devices* by B. G. Streetman & S. Banerjee (Prentice Hall, 2000)
2. *Fundamentals of Modern VLSI Devices* by Y. Taur & T. H. Ning (Cambridge University Press, 1998)

Homework:

Weekly assignments will be posted online on Mondays, and will be due one week afterward (at the beginning of class). Late homework will not be accepted.

Students are encouraged to discuss homework problems with other students in the class, the TA's, and/or Prof. Liu. However, the work which you submit for grading must be your own.

Quizzes:

Six quizzes (25 minutes each) will be given periodically in class throughout the semester. These are intended to gauge the student's understanding of the basic concepts covered in the course, and hence will not require extensive numerical calculations (*i.e.* calculators should not be needed). All quizzes will be closed book, with 1 page of notes allowed. The lowest quiz score will be dropped for each student (*i.e.* only the top 5 quiz scores will be used in determining the course grade).

Design Project:

Students will gain experience in bipolar junction transistor design through a term project. Teams of two will be permitted; each team must work independently (*i.e.* sharing of work across teams is not allowed). Details will be provided later in the semester.

Final Exam:

The final exam will be closed book, with 6 pages of notes allowed. Students will need to bring a calculator. The final exam will be given on **Saturday 5/12 from 12:30-3:30 PM**. No early final exam will be offered.

Grading:

The numerical score on which the course grade will be based is derived as follows:

Homework: 10%	Project: 20%
Quizzes: 6% each	Final Exam: 40%

Letter grades will be assigned based approximately on the following scale:

98-100: A+	88-98: A	85-88: A-
83-85: B+	73-83: B	70-73: B-
68-70: C+	58-68: C	55-58: C-
45-55: D	<45: F	

Course Accommodations:

Students may request accommodation of religious creed, disabilities, and other special circumstances. Please make an appointment with Prof. Liu to discuss your request, so that she can plan accordingly in advance.

Classroom Etiquette:

- Arrive in class on time!
- Bring your own copy of the lecture notes (posted online at least one day in advance).
- Turn off cell phones, pagers, MP3 players, etc.
- No distracting conversations -- relevant questions are encouraged

Weekly Coffee Hour (beginning on Wednesday 1/24):

Students are invited to join Prof. Liu for informal discussion over coffee/tea/smoothies every Wednesday at 4PM at Brewed Awakenings, 1807 Euclid Avenue. (Beverage costs will be covered by Prof. Liu.)