EE331: Devices and Circuits I

Autumn Quarter 2012

Department of Electrical Engineering, University of Washington

Welcome to EE 331! The first stop in your journey to learn the art of electronics!

We will be covering a large volume of material during this quarter. Hopefully, this course will be both informative and fun.

There are four main topics covered in the course:

1. Physics of conduction in semiconductors
2. Solid-state diodes and their use in non-linear circuits
3. Physics and applications of Field Effect Transistors (FET)
4. Logic circuit design

We will begin with a study of the phenomenon of conduction in semiconductors. This provides the basis for understanding the principles of operation for two very important classes of electronic components: diodes and FETs. After a comprehensive study of these components, we will use them to design and build logic gates and more complicated circuits. By the end of this quarter you will be able to:

1. *Calculate* conduction properties of materials and simple device structures
2. *Explain* the operating principles of semiconductor diodes and FETs
3. *Determine* the in-circuit operating state of diodes and FETs
4. *Perform* large signal analysis of circuits containing semiconductor diodes and FETs
5. *Use* a modern schematic capture and computer-aided circuit analysis program (SPICE)
6. *Calculate* the performance parameters for different MOS logic families

Class Information:

Instructor:	Tai-Chang Chen tcchen[at]uw.edu
Office Hours:	Thursdays & Fridays 9:30-10:30am
Webpage:	http://faculty.washington.edu/tcchen/EE331/
	Make sure to check the class web frequently for class announcements, and reading assignments. Exam dates, holidays, … . The solution to the problem sets will be posted after collecting HWs as well.
Lectures:	MTWF 10:30am – 11:20am **at MEB 238**
Textbook:	R.C. Jaeger, Microelectronic Circuit Design., 4th edition, New York : McGraw-Hill, 2010 (required)
	Lab Handbook: Print from the class webpage

Grading:

Segment	Weighting
Homeworks	15% (the lowest will be dropped)
Laboratory Reports	15% (5 total, 3% each)
Design Project	10%
2 Midterms	34% (17% each)
Final Exam	26%
	Total: 100%

Homeworks: There will be weekly homework assignments. Be prepared since some of the assignments may require a significant time commitment. Homeworks will be handed out each Friday and collected at the beginning of the class the following Friday. No late homework will be accepted. You are encouraged to discuss the problems with other students but the final work that you hand in should represent your own understanding of the solution. You will have the option of dropping the one with the lowest grade.

Exams: There will be three in-class exams, two 50 minutes midterm and one two-hours final. No make-up exam will be given. Failure to attend an exam or to make prior arrangements will result in a zero. The exams are normally closed book, closed-note, and closed homework. Make sure to bring a calculator to all exams.

Laboratory: Making real, working systems is the ultimate goal of engineering. In this course we will have weekly lab sessions. The lab sessions in the first part of the course will provide you with an opportunity to see the material covered during the class in action: what happens when we bias a diode, how can we hook up a few gates to make a ring oscillator, …

Laboratory results should be your group original work. Copying measurements made by another group without indicating in your report is cheating. So is letting someone copy your measurements.

In the second part of the class, we will spend about three weeks on a design project. Here, you will be presented with a current engineering problem. You are expected to come up with an innovative solution to this problem and demonstrate it in the lab. The scores you receive for the lab reports and the design project will determine your final lab grade.

Lab Sections:
AA T 12:30 – 3:20pm
AB W 11:30am – 2:20pm
AC Th 8:30 – 11:30am

Computers: We will be using a simulation program (Multisim) for many of the assignments. There is a quick tutorial document in the course website. The program is available in computing labs in the EE/CSE buildings.

Academic Integrity

If you cheat, you cheat yourself of the opportunity to learn the material, and you cheat your classmates — all of your classmates — out of grades they have earned. If you let someone else copy your work, you are allowing them to devalue your grade and that of your fellow students. Cheating is a bad way to embark on a career in engineering. Cheaters make bad engineers, and you should be a good one. You can help by not tolerating cheating by your fellow students. The TAs and I will monitor for cheating and I will resolve all cheating cases in accordance with College of Engineering and University policy. Please help avoid this by avoiding even the appearance of possible cheating. Cheating can result in failure of the course and/or eventual expulsion from the University.