Analog Electronics

PHYS 431 - Winter 2007

http://physics.uoregon.edu/~torrence/431/

Updated Tuesday February 06, 2007

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HW4 due Monday Feb. 12
Lab3 due on Friday Feb. 9th (see updated syllabus)

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Office Hours: Tues 2-3 (in
the lab)

Lecture MWF 12:00-12:50 Willamette 112

Lab schedule
Note: An assigned lab time is not strictly required.
Students are encouraged to work the labs on their own.

Textbook Art of Electronics, 2nd Ed., Horowitz and Hill
Student Manual for A of E, Hayes and Horowitz (not required)
A copy of each is on reserve in the Science Library.

Overview

This course will introduce the basic concepts of analog electronics. The emphasis will be on a basic working knowledge of
analog devices and building blocks, suitable for experimental research in science. The following topics will be covered:

- Passive components (resistors, capacitors, inductors, diodes)
- AC circuit analysis
- Transistor properties and basic circuits
- Operational amplifiers, positive and negative feedback
- Common useful applications: amplifiers, filters, buffers
- Power circuits and regulators

Grading

Course grades will be based on seven weekly homework assignments (35%), seven lab assignments (35%), two midterm exams
(10% each), and a final exam (10%).

In order to pass the course, you must complete the labs!

Syllabus

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<th>Week</th>
<th>Lecture</th>
<th>Lab (due Friday)</th>
<th>Homework (due Monday)</th>
<th>H &amp; H Reading</th>
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1 of 3
This syllabus is tentative, and is subject to change as the quarter progresses.

Lecture Notes

Horowitz and Hill is a problematic book for undergraduates, as it contains far too much information. In many ways it is more of a reference than a textbook, and in fact you will find that most experimental physicists have a copy on their bookshelf. No other book that I know of, however, contains as much useful and practical information, and being able to pick it up and find what you need is a skill which any experimentalist should have.

To help supplement the material in Horowitz and Hill, I will provide a series of lecture notes originally written by Prof. Frey. These will cover more closely the material we go over in class, and will probably be easier to pick up than starting with the book. Another very useful source of information is the Student Manual, on reserve in the science library.

- Notes 1 - DC Circuits
- Notes 2 - AC Circuits
- Notes 3 - Diodes and Transistors
- Notes 4 - Transistor Circuits I
- Notes 5 - Transistor Circuits II

If you are having trouble accessing the notes, try going directly to the notes directory. Download the PDF files directly and open using a PDF viewer.

Labs

Lab reports are due on the Friday of the week when labs are assigned. I really want to see proof that you did the lab and understood the material. Neatly organized notes taken during the lab itself, answers to the questions posed in the lab writeup, plus a short summary giving the main quantitative results in your notebook is perfectly adequate. If you are very sloppy in your notes, you may also turn in a longer printed write up, but please get into the habit of taking neat legible lab notes. Either way, please turn in your lab notebook (legible or not) on Friday by 5PM. There will be a box in the lab room.
• Lab 5 - Intro to OpArps
• Lab 6 - OpAmp Circuits
• Lab 7 - Intro to Phase-Locked Loops

Homework

Homework will typically be assigned Wednesday and due on the following Monday at the start of class. Many of the homework problems are simply to force you to work through a particular concept 'by hand' at least once. The exams will closely follow the homework assignments, so it is worth making sure that you can do all of the homework problems. I reserve the right to not grade every single problem in detail.

• HW 1 - DC Circuits
• HW 2 - AC Circuits
• HW 3 - Diodes and Transistors
• HW 4 - Transistor Circuits