

Department of Electrical and Computer Engineering  
520.345 Electrical and Computer Engineering Laboratory  
Fall 2009

2009-2011 Catalog: This course consists of 11 one-week laboratory experiments intended to provide an introduction to analog and digital circuits commonly used in engineering. Topics include phase and frequency response, transistors, operational amplifiers, filters, and other analog circuits. The experiments are done using computer controlled digital oscilloscopes, function generators, and power supplies. (3 Credit Hours/Elective)

Prerequisite(s): 520.213 Circuits  
171.101-102 General Physics for physical science majors

Textbook: A.S. Sedra and K.C. Smith, *Microelectronic Circuits*, Oxford University Press

Course Objectives: The objectives of this course are to provide students with “hands-on” experience in building and “trouble-shooting” electronic circuits, to provide experience using modern computer controlled digital oscilloscopes, programmable power supplies, and function generators to measure circuit properties, and to use computer controlled data collection to document and analyze circuit behavior. Students first study simple electronic components (e.g., diodes, transistors, op-amps), and then use combinations of them to construct more complex electronic devices such as voltage controlled oscillators, active filters, and phase sensitive detectors. Additional course objectives are to give students some experience in technical writing through short laboratory reports and one detailed formal report on one of the experiments done during the semester.

Topics Covered:

1. High pass, Low Pass, Bandpass and Notch filters
2. Semiconductor diodes
3. Bipolar junction transistors
4. Models for bipolar junction transistors
5. Differential amplifiers
6. Field effect transistors (MOSFETS)
7. Basic Op-Amp circuits
8. Schmidt triggers and voltage controlled oscillators
9. Active filters
10. Synchronous detection
11. Phase lock loops

Class Schedule: 1 hour lecture, 3.5 hour of laboratory/weekly (ME students get an additional 1 hour lecture)

Contribution of Course to Meeting the Professional Component (credit hours):

<b>Engineering Science</b>	<b>Engineering Science and Design</b>
	3

Relationship of Course to Program Educational Outcomes ( $\checkmark$  those that apply):

	Apply mathematics, probability and statistics, basic science, and computer science
x	Design and conduct experiments, analyze and interpret data
x	Identify, formulate and solve electrical engineering problems
	Use technical skills and modern engineering tools to design to meet needs
	Communicate effectively and work on multidisciplinary teams
	Contemporary issues, ethical responsibilities, environmental, health, safety issues
	Engage in life-long learning

Updated April 1, 2009 by: Jin U. Kang