EE 2011 - Linear Systems, Circuits, and Electronics

Required or Elective:
Required

Catalog Description:
(3.0 cr; Prereq-2001; fall, spring, summer, every year)
Sinusoidal steady state analysis. AC power calculations. Laplace transforms. Laplace transforms in circuit analysis. Elementary filter circuits. Frequency response of elementary MOSFET amplifiers. BJT characteristics and biasing. BJT small signal models and elementary amplifiers. Frequency response of BJT amplifiers. Use of circuit simulators.

Contact Hours:
3 hours of lecture, 1 hour of discussion per week

Text:
Electric Circuits, James W. Nilsson and Susan A. Riedel, 9th Ed., Prentice-Hall
Microelectronic Circuits, Adel S. Sedra and Kenneth C. Smith, 6th Ed., Oxford Univ. Press

Prerequisites by Topic:
DC/resistive circuit analysis. Time domain analysis of RC, RL, and RLC circuits. Diode and FET dc and small signal analysis. CMOS logic gates. Basic knowledge of circuit simulator useage.

Course Objectives:
1) The ability to analyze circuits in the sinusoidal steady state using phasors.
2) The ability to use Laplace transform techniques to create system-level circuit descriptions in order to do time-domain and frequency domain analysis of circuits.
3) An understanding of elementary filter circuits.
4) The ability to determine the frequency response of elementary MOSFET amplifiers.
5) An understanding of the characteristics and biasing of bipolar junction transistors.
6) An understanding of the small signal models of BJTs and their use in elementary amplifiers.
7) The ability to determine the frequency response of elementary BJT amplifiers.
8) The ability to use circuit simulators to analyze circuits including amplifiers.

Instructor:
Varies from semester to semester. Several ECE faculty rotate teaching this course

Assessment: (percentages are approximate and vary somewhat with instructor)
Weekly problem assignments - 10%
Hour (mid-term) Exams (one or two) 40%
Quizzes (some unannounced) - 10%
Final exam - 40%

Course Outline:

Week #	Lecture Topics	# of Hours	Chapter
1	Sinusoidal Steady State Analysis (phasors)	2	NR-9
2	Sinusoidal Steady State Analysis	3	NR-9,10
3	AC Power Calculations	3	NR-10
4	AC Power Calculations Intro. to Laplace Transforms	1 2	NR-10 NR-12
5	Intro. to Laplace Transforms Laplace Transforms in Circuit Analysis	1 2	NR-12 NR-13
6	**Hour Exam #1** Laplace Transforms in Circuit Analysis	1 2	NR-9,10,12 NR-13
7	Laplace Transforms in Circuit Analysis	3	NR-13
8	Laplace Transforms in Circuit Analysis Frequency Selective Circuits	1 2	NR-13 NR-14
9	Frequency Selective Circuits Review of MOSFET characteristics and amplifiers	1 2	NR-14 SS-5
10	Frequency Response of MOSFET amplifiers	3	SS-9
11	**Hour Exam #2** Frequency response of MOSFET amplifiers	1 2	 SS-9
12	BJT Characteristics, load lines, and biasing	3	SS-6
13	BJT Single transistor amplifiers	3	SS-5
14	Frequency response of BJT amplifiers	3	SS-9
15	Frequency response of BJT amplifiers Review	1 1-2	SS-9

NR = Nilsson and Riedel SS = Sedra and Smith

Relationship to Professional Component:
This course is part of the engineering science an engineering design requirement of the professional component.

Relationship to Program Outcomes:
In accordance with ABET accreditation criteria, all engineering programs must demonstrate that their students achieve certain outcomes. Of the outcomes listed in the ABET criteria (enumerated as (a) through (k)), this course teaches skills which help the student achieve the following outcomes:
(a) an ability to apply knowledge of mathematics, science, and engineering
(e) an ability to identify, formulate, and solve engineering problems
(i) a recognition of the need for, and an ability to engage in life-long learning
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Prepared by: William P. Robbins, Spring 2011