

EE 3115 - Analog Electronics

Required or Elective:

Required

Catalog Description:

(3.0 cr; Prereq-[3015 or & 3015, IT] or %; fall, spring, summer, every year)

Basic differential amplifiers using FETs and BJTs. Current sources for differential amplifiers. Op- amp-based differential amplifiers. IC op amps as multi-stage amplifiers. Ideal (dc) feedback. Stability and compensation of negative feedback amplifiers. Sinusoidal oscillators. Waveshaping circuits. Power amplifiers. Use of circuit simulators.

Contact Hours:

3 hours of lecture, 1 hour of discussion per week

Text:

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, FET, and BJT dc and small signal analysis including frequency response. CMOS logic gates. Laplace and phasor analysis. Basic knowledge of circuit simulator usage.

Course Objectives:

- 1) The ability to analyze and design basic microelectronic circuits and at the functional block level - including different blocks such as differential amplifiers and power amplifiers.
- 2) The ability to analyze feedback circuits in terms of their classical feedback topologies.
- 3) The ability to analyze sinusoidal oscillator circuits.
- 4) The ability to analyze basic waveshaping circuits including relaxation oscillators.
- 5) The ability to use circuit simulators to analyze circuits.

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	Review of MOSFET and BJT amplifiers	2	5,6
	Basic FET diff amps	1	8.1-8.2
2	Basic FET Diff Amps	3	8.1-8.2
3	Basic BJT Diff Amps	2	8.3
	Current Sources for diff amps	1	7.4-7.5
4	Current sources for diff amps	2	7.4-7.5
	Op amp based diff amps	1	2.4
5	Op amp based diff amps	1	2.4
	IC op amps	2	8.6
6	Hour Exam #1	1	
	IC Op amps as multi-stage amplifier	1	8.6
	Ideal (dc) negative feedback	1	10.1-10.8
7	Ideal (dc) negative feedback	3	10.1-10.8
8	Ideal (dc) negative feedback	2	10.1-10.8
	Stability and compensation of Neg FB amplifiers	1	10.9-10.13
9	Stability and compensation of Neg FB amplifiers	3	10.9-10.13
10	Stability and compensation of Neg FB amplifiers	2	10.9-10.13
	Sinusoidal oscillators	1	17.1-17.3
11	Hour Exam #2	1	
	Sinusoidal Oscillators	2	17.1-17.3
12	Sinusoidal oscillators	1	17.1-17.3
	Waveshaping circuits	2	17.4-17.9
13	Waveshaping circuits	3	17.4-17.9
14	Power Amplifiers	3	17.4-17.9
			11,1-11,9
15	Power Amplifiers	2	11.1-11.9
	Review	1	

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 used in practice.

Prepared by: William P. Robbins, Spring 2011