

DEPT: Etec

COURSE NO: 379

CREDITS: 5

QUARTER: Spring, 2006

TIME: lecture W Tu Th F 11:00 - 11:50
lab W 10:00 - 12:00

1. COURSE TITLE: ACTIVE LINEAR AND NONLINEAR CIRCUITS

2. COURSE DESCRIPTION: Upper division treatment of active linear and nonlinear circuits. Analysis, design and testing of electronic circuits and subsystems with primary emphasis on the application of integrated circuit components and modules. Computer modeling and simulation of complex electronic circuits including active filters, instrumentation amplifiers, oscillators and multivibrators. Laboratory testing of designed circuits and formal report writing.

3. COURSE PREREQUISITES: Etec 372, Etec 375, Etec 378

Specific topics:

1. Laplace transforms
2. Transfer function concepts
3. Discrete semiconductor devices
4. Transient and frequency response of circuits

TEXTBOOK(S): *Design with Operational Amplifiers and Analog Integrated Circuits, 3rd*

Sergio Franco

McGraw-Hill, 2002 (**text is out of print**)

STUDENT WORK AND EVALUATION: (tentative)

1. Two one-hour exams ----- 40 - 50 %
2. Final exam -----Monday, June 5 , 2006 , 8:00 - 10:00 am----- 20 - 30 %
3. Homework and quizzes -----10 - 15 %
4. Lab work, lab notebook, lab reports ----- 20 %

MAJOR COURSE BEHAVIORAL OBJECTIVES: Upon completion of this course the student should be able to:

1. Design, analyze and test electronic circuits implemented with linear IC's.
2. Simulation of circuits and systems with SPICE software packages.
3. Specify, design and test active filter circuits.
4. Use available laboratory equipment for pulse and frequency response testing of designs.
5. Design and evaluate instrumentation amplifiers.
6. Design, evaluate and test nonlinear circuits (limiters, oscillators, etc).
7. Document all design and laboratory testing in the form of an engineering notebook.

7. CONTENTS:

<i>WEEK</i>	<i>TOPICS AND CONCEPTS</i>	<i>CHAPTER</i>
1	Operational amplifier fundamentals Ideal behavior and analysis Negative feedback, loop gain	1
2	Ideal operational amplifier circuits with resistive feedback Current-to-voltage and voltage-to-current amplifiers Instrumentation amplifiers	2
3	linear operational circuits with reactive feedback Transfer functions First-order active filters Audio filter applications	3
4	TEST #1 Second-order responses Sallen-Key second order filter Bandpass filter circuits	3 Notes
5	State-variable filters Cascading active filters Stagger tuned filters Switched capacitor filters	3 Notes
6	Static op amp limitations Offset voltages and bias currents Offset voltage and offset current drift TEST #2	5
7	dynamic op amp limitations Small signal bandwidth Slew rate limiting	6
8	Nonlinear op amp circuits Voltage comparators Schmidt triggers Sample and hold circuits	9
9	Signal generators Sinewave oscillators Relaxation oscillators Function generators	10
10	D-A and A-D conversion	12