Number: ENGR 331 (Section 01)

Title: Electronics II

Credits: 5 credits

Course Format: Four one-hour lectures per week. One two-hour lab. per week.

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Catalog Description:
Electronics II is the second course in modeling, and application of semiconductor devices and integrated circuits. Advanced transistor amplifier analysis, including feedback effects. Design for power amplifiers, op-amps, analog filters, oscillators, A/D and D/A converters, and power converters.

Learning Objectives (and corresponding mapping to ABET Criteria 3): Upon completion of this course, students will be able to:
1. Design current source circuits to provide a specified current and output resistance (ABET 3c, 3e).
2. Analyze the DC and AC characteristics of amplifier circuits using transistors as load devices (active loads) (ABET 3a).
3. Derive the system transfer of electronic circuits and develop the Bode Diagrams (ABET 3a).
4. Analyze the frequency response of various amplifying circuits (ABET 3b).
5. Describe feedback concepts, in general terms: advantages and disadvantages of using feedback (ABET 3j).
6. Determine the loop gain and the stability criteria of feedback circuits (ABET 3a, 3c, 3k).
7. Analyze and Design Basic Oscillator circuits (ABET 3c, 3e)
8. Use CAD tools such as SPICE to model, analyze, simulate, design and improve the functionality of semiconductor devices, circuits, and systems (ABET 3i, 3j, 3k).


Prerequisites: ENGR 330 (Electronics II) or consent of the instructor.

Topics:
- Differential and Multistage Amplifiers
- Frequency Response
- Feedback
- Oscillators
- Analog Filters
- Wave-shaping circuits
- A/D and D/A converters

Computer Usage:
1. Extensive CAD tool use for Design Entry and Simulation.
2. Design projects and laboratory assignments involving formal technical reports requiring the use of word processing and graphics software for their presentation.

Laboratory:
Laboratory experiments and design assignments require an understanding of basic semiconductor devices and circuit analysis and design and involve the use of CAD tools, personal computers, writing skills and teamwork.
Grading:  
A = 3.5–4.0 (90–100%), B = 3.0–3.4 (80–89%), C = 2.0–2.9 (70–79%),  
D = 1.0–1.9 (60–69%), F = 0.0 (0–59%)  

Homework:  10%  
Labs  20%  
Midterm exam:  35%  
Final exam/project:  35%  

Course Outcomes and mapping to ABET Criteria 3:

a. *An ability to apply knowledge of mathematics, science, and engineering.*  
   Students are required to use their background in mathematics, physics and engineering to successfully finish  
   homework, labs, and exams.

b. *An ability to design and conduct experiments, as well as to analyze and interpret data.*  
   Students are required to design and implement lab experiments for analyzing, designing, and improving  
   circuits and systems.

c. *An ability to design a system component, or process to meet desired needs within realistic constraints.*  
   Homework, laboratory experiments, and exams require students to analyze, design, evaluate, and improve  
   circuits and systems that must meet specified constraints.

d. *An ability to function effectively on multi-disciplinary teams.*  
   n/a

e. *An ability to identify, formulate, and solve engineering problems*  
   Homework and labs require students to identity, formulate, model and solve several engineering challenges.

f. *An understanding of professional and ethical responsibility.*  
   n/a

g. *An ability to communicate effectively.*  
   Students need to write several lab. reports.

h. *Understand impact of engineering solutions in a global, economic, environmental and societal context*  
   n/a

i. *A Recognition of the need for, and an ability to engage in life-long learning*  
   Students must self-learn the use of CAD tools.

j. *A Knowledge of contemporary issues*  
   Homework, and lab. experiments are based on state of the art technologies and methodologies

k. *An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.*  
   Lab. experiments require the use of current methodologies, and CAD tools.

Prepared by:  Claudio Talarico  
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