Course Syllabus

ELCT 371 -- Electronics

Course Coordinator: Undergraduate Program Committee

Catalog Description: Introduction to Analog Circuit Design and Analysis

Credit Hours: 3

Prerequisite(s) by course: CSCE 211 and ELCT 222

Prerequisite by topics: Signals & Systems and Number System


Other Materials: Class notes posted on Blackboard

Course Outcomes:

Students who successfully complete the course will be able to:

- communicate effectively in the language of electronic systems, including correct understanding and use of technical terms
- analyze the characteristics (input impedance, output impedance, bandwidth, gain, phase margin) of a circuit that contains a black-box amplifier and external circuitry.
- analyze amplifier circuits with feedback loop
- apply concepts and equations to determine the basic operating characteristics of diodes, bipolar transistors and field effect transistors
- compute the bias points of electronic elements including diodes, bipolar transistors, and field effect transistors, given a circuit diagram and device characteristics
- analyze the frequency responses of amplifier circuits.
- design a circuit that will bias a transistor at a particular quiescent point
- design a basic amplifier having prescribed gain characteristics

Course Topics:

- Introduction to electronics: generic amplifier model, basic definitions; decibel notations; trans-conductance amplifiers, differential amplifier basics
- Operational amplifiers: summing-point constraint, inverting and non-inverting amplifiers, and Schmitt trigger. Design of simple amplifiers, op amp limitations, gain, bandwidth, open-loop and closed loop gain, open and closed loop break frequencies. Op amp frequency limitations, large signal operations, slew-rate, and full-power bandwidth.
- Diodes and diode circuit characteristics, load-line analysis, and rectifier circuits: The ideal diode model and circuits consisting of ideal diodes. Voltage regulator circuit design. Linear small-signal equivalent circuits, Shockley equation, dynamic resistance, and voltage controlled attenuator.
- Bipolar junction transistors (BJT): Basic operation, currents and voltages, definition of parameters, equation for currents as function of device parameters. Load line analysis, distortion, large signal DC circuit models. BJT Biasing circuits. BJT small-signal equivalent circuit. The common-emitter amplifier. The Emitter Follower.
- Frequency response of amplifiers: Bode plots, the FET common source amplifier at high frequencies. The Miller effect, its application to FET amplifiers, and the hybrid pi model for the BJT. Common emitter amplifiers and emitter followers at high frequencies.

Course Contribution to Program Outcomes:

ELCT 371 contributes to an achievement of:

Outcome A -- an ability to apply knowledge of mathematics, science and engineering
Outcome E -- an ability to identify, formulate, and solve engineering problems
Overall Course Policies

Academic Integrity
Assignments and examination work must be the sole effort of the student submitting the work. Students are required to follow the University of South Carolina Honor Code and should note that every instance of a suspected violation will be reported. Students found responsible for violations of the Code will be subject to academic penalties under the Code in addition to whatever disciplinary sanctions are applied.

Accommodating Disabilities
Reasonable accommodations are available for students with a documented disability. If you have a disability and may need accommodations to fully participate in this class, contact the Office of Student Disability Services: 777-6142, TDD 777-6744, email sasd@mailbox.sc.edu, or stop by LeConte College Room 112A. All accommodations must be approved through the Office of Student Disability Services.

Diversity
In addition to scheduling exams, I have attempted to avoid conflicts with major religious holidays. If, however, I have inadvertently scheduled an exam or major deadline that creates a conflict with your religious observances, please let me know as soon as possible so that we can make other arrangements.

Recommended Study Habits
- Study relevant materials before class
- Ask questions in class and participate in in-class problem solving
- Prepare for exams
- Take notes during class

Amending the Syllabus/Rules
Amendments and changes to the syllabus may occur upon review by the instructor and the undergraduate committee in subsequent semesters.