EEE 3300 — Electronics

Curriculum Designation: Required course for EE majors. Elective for CpE majors.

Course (Catalog) Description: Diode models and circuits; DC biasing of bipolar-junction and field-effect transistors; small- and large-signal transistor models; frequency analysis of single-stage AC amplifiers.

Prerequisite: EEL3112, MAP2302

Textbooks/Required Material: Microelectronic Circuits & Devices, Author: Horenstein, Publisher: Pearson Education, Edition: 2nd, Copyright Year: 1996

Course Objectives:
1. Analyze basic circuits using Ohm's, Kirchhoff's, and superposition laws, as well as Thevenin and Norton equivalent circuits.
2. Describe the nonlinear I-V characteristics of the p-n junction diode, and solve simple circuits containing two-terminal nonlinear elements.
3. Classify the electronic circuits made from two-terminal nonlinear elements, including clipping, limiting, and rectification, and analyze and design power-supply circuits.
4. Describe the I-V characteristics of three-terminal devices including field-effect transistor (FET) and bipolar junction transistor (BJT); and identify the type of device given the I-V characteristics.
5. Analyze and design basic circuits containing three-terminal devices, determine the relationship between the input and output voltages, and determine the device parameters.
6. Analyze and design single transistor amplifier circuits, and determine the small-signal gains of the amplifier using the small-signal model.
7. Identify and determine high and low-frequency capacitor in amplifiers, derive frequency response of basic amplifiers, and design an amplifier to meet frequency response criteria.

Topics covered:
1. Review of Circuit Analysis
2. Basic Semiconductor Theory
3. Operational Amplifier Circuits
4. Diodes and Applications
5. Bipolar Junction Transistor (BJT): DC Analysis and Biasing
6. BJT Amplifier Circuits: Small-Signal Analysis and Frequency Response
7. Metal Oxide Semiconductor Field Effect Transistor (MOSFET): DC Analysis and Biasing
8. MOSFET Amplifier Circuits: Small-Signal Analysis and Frequency Response
9. BJT and MOSFET Amplifier Circuit Configurations

Class Schedule: Three 50 minute or two 75 minute lectures per week (3 credit hours).
Subject Area: Engineering

Significant Design: Yes

Relationship to Assessed ABET Student Outcomes: None

Last Updated by: R.J. Perry       Date: April 30th, 2021