ENEE205: Electric Circuits

Credits: 4

Description

Prerequisite: Minimum grade of C- in PHYS260; and minimum grade of C- in PHYS261; and permission of ENGR-Electrical & Computer Engineering department.

Corequisite: MATH246.

Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical).

Credit only granted for: ENEE204 or ENEE205.

Formerly: ENEE204.

Design, analysis, simulation, construction and evaluation of electric circuits. Terminal Relationships. Kirchoff's laws. DC and AC steady state analysis. Node and mesh methods. Thevenin and Norton equivalent circuits. Transient behavior of first- and second-order circuits. Frequency response and transfer functions. Ideal op-amp circuits. Diode and transistor circuits.

Semesters Offered

Fall 2017, Spring 2018, Summer 2018, Fall 2018, Spring 2019, Summer 2019, Fall 2019, Spring 2020, Summer 2020, Fall 2020, Spring 2021

Testudo

Learning Objectives

- Identify common circuit components: resistors, inductors, capacitors, independent sources, diodes, transistors, and op-amps; understand the terminal relations and models that are used to describe the operating characteristics of these components
- Understand and systematically apply basic circuit laws governing voltages and currents (Kirchhoff's Laws)
- Analyze linear AC/DC steady-state circuits
- Use basic circuit techniques (i.e., Nodal analysis, superposition, parallel and series combinations, equivalent transformations, Thevenin and Norton equivalents) to analyze and design linear circuits
- Understand circuit transients and calculate responses for first and second order circuits
- Understand elementary concepts of electronic circuits such as operational amplifiers and their circuit models
- Analyze and design multiple op-amp circuits

- Use basic test and measurement equipment necessary to evaluate the performance of simple electric and electronic circuits
- Understand basic limitations, inaccuracies, and tolerances of the test equipment, components, and procedures
- Design circuits with efficient reliability and cheaply achieve the desired results
- Use good techniques for drawing circuits and wiring diagrams, breadboarding circuits, and trouble shooting circuits
- Use simulation tools to design circuits and analyze performance
- Work cooperatively with others in the lab to maximize results

Topics Covered

- Basic circuit variables and electric/electronic components, sources and models
- Kirchoff's Laws and time-domain formulation of circuit problems
- AC steady state formulation of circuit problems
- Equivalent transformations of electric circuits
- Superposition, nodal analysis, and other analysis techniques
- Thevenin's and Norton's theorems and their applications
- First and second order transient analysis
- Frequency response and filters
- Modern circuit applications
- Laboratory implementation of circuit designs

Learning Outcomes

- Ability to apply knowledge of math, science, & engineering (Significant)
- Ability to design/conduct experiments and analyze/interpret data (Significant)
- Ability to design a system, component, or process to meet needs (Significant)
- Ability to function on a multi-disciplinary team (Moderate)
- Ability to identify, formulate, and solve engineering problems (Moderate)
- Ability to communicate effectively (Moderate)
- Techniques, skills, and modern engineering tools necessary for engineering practice (Significant)