Syllabus

ESC 222 Electric Circuits

General Information

Date

March 7th, 2018

Author

Selim Araci

Department

Science and Technology

Course Prefix

ESC

Course Number

222

Course Title

Electric Circuits

Course Information

Credit Hours

4

Lecture Contact Hours

3

Lab Contact Hours

2

Catalog Description

This course is designed as the introductory course in linear circuit analysis normally offered to engineering students in the sophomore year. It provides an introduction to the theory of circuit analysis. Subject areas include Kirchhoff's Laws, node and mesh analysis, source transformation, Thevenin and Norton theorems, RC, RL, and RLC circuits, sinusoidal response, phasors, and power. An introduction to op-amps is included. There is a strong emphasis on problem solving in the course.

Key Assessment

This course contains a Key Assessment for the AS Engineering Science program

Prerequisites

None

Co-requisites

PHY 152

Grading Scheme

Letter

First Year Experience/Capstone Designation

This course DOES NOT satisfy the outcomes applicable for status as a FYE or Capstone.

SUNY General Education

This course is designated as satisfying a requirement in the following SUNY Gen Ed category

None

FLCC Values

Institutional Learning Outcomes Addressed by the Course

Vitality
Inquiry
Perseverance
Interconnectedness

Course Learning Outcomes

Course Learning Outcomes

1. Analyze a D.C. electrical circuit using various theoretical methods and algebra to calculate voltage, current, and power.
2. Analyze transient electrical circuits using various theoretical methods and calculus to calculate voltage, current, and power.
3. Analyze an A.C. electrical circuit using various theoretical methods and complex numbers to calculate voltage, current, and power.
4. Analyze a D.C. or an A.C. circuit using a simulation software.
5. Compare measured voltage and current of circuits constructed in lab to the theoretically calculated values.

Outline of Topics Covered

I. Introduction, voltage, current, power, energy, ideal basic circuit element
II. Voltage and current sources, electrical resistance, Ohm's law

III. Kirchhoff's laws, circuit with dependent source

IV. Resistors in series and parallel, voltage and current divider circuits

V. Delta-to-wye circuits

VI. Basic Node-voltage method

VII. Node-voltage method with dependent sources and some special cases

VIII. Basic Mesh-current method

IX. Mesh-current method with dependent sources and some special cases

X. Source transformations, Thevenin, Norton equivalent circuits

XI. Maximum power transfer, superposition

XII. Application of circuit simulation tool MultiSim

XIII. Inductor and capacitor

XIV. Series and parallel combinations of inductors and capacitors

XV. The natural response of RL and RC circuits

XVI. Step response of RL and RC circuits

XVII. General solution for step and natural responses, sequential switching

XVIII. Natural response of parallel RLC circuit

XIX. Step response of parallel RLC circuit

XX. Natural and step responses of a series RLC circuit

XXI. The sinusoidal source, the sinusoidal response

XXII. The phasor, passive circuit elements in the phasor domain

XXIII. Kirchoff's laws, series, parallel, delta-to-wye simplifications in phasor domain

XXIV. Source transformations, Thevenin-Norton equivalent circuits in phasor domain

XXV. The node-voltage and mesh-current method in the phasor domain

XXVI. Use and understanding of oscilloscopes