East Carolina University - Department of Engineering - Course Syllabus

ENGR 3014: Electric Circuit Analysis

This course is required for all Engineering students.

Course Coordinator:
Jianchu (Jason) Yao

Catalog Description:
This course covers basic electrical and electronic engineering concepts, theory, and methods. Specific areas include electric circuit analysis, electromechanics, and electrical instrumentation systems. The subject matter is geared for engineering students of all concentrations.

Course Structure:
Three 50-minute lectures and one two-hour laboratory session per week (three credits)

Prerequisites:
MATH 2154 Differential Equations and Linear Algebra
PHYS 2360 University Physics II

Required Materials:
Fundamentals of Electric Circuits, 3rd Ed. by Alexander and Sadiku, McGraw Hill, 2007

Course Learning Outcomes:
Upon completion of this course, students shall be able to:

- Analyze simple DC circuits
- Find Thevenin and Norton equivalencies of circuits
- Analyze AC steady-state responses of resistance, inductance, and capacitance in terms of impedance
- Perform calculations of transient responses of capacitors and inductors
- Analyze AC circuits in the frequency domain
- Perform DC and AC steady-state power calculations
- Describe the principles, classification, configuration, and characteristics of DC/AC electric machines
- Construct circuits on breadboards and perform electrical measurements

Lecture Topics

- Electric charge, current, voltage and Ohm's law
- Nodes, branches, loops, and Kirchhoff's laws
- Series/parallel resistors
- Nodal voltage analysis
- Mesh current analysis
- Principles of superposition
- Thevenin/Norton equivalent circuit
- Operational amplifiers and useful amplification circuits
- Capacitors and inductors
- RC, RL, and RLC circuits
- Complex numbers and phasors
- AC circuits
- Impedance and admittance
- AC power
- Power factor and power factor correction
- Electric machines

Laboratory/Recitation Topics:

- Thevenin/Norton equivalent circuits
- Operational amplifier circuits
- RC circuits
- Simulation of dynamic circuits with MATLAB
- Design of a thermistor-based thermometer

- Thermistor characterization
- Modeling and simulation of a Wheatstone amplification circuits
- Linearization of the amplification circuit
- Integration of a thermistor-based thermometer
- Calibration of the thermometer

Relevant Program Outcomes:
Graduates of the Engineering Program will demonstrate

a) Graduates of the Engineering Program will demonstrate an ability to apply knowledge of mathematics, science, and engineering.

b2) Graduates of the Engineering Program will demonstrate an ability to analyze and interpret data.

e) Graduates of the Engineering Program will demonstrate an ability to identify, formulate, and solve engineering problems.

k) Graduates of the Engineering Program will demonstrate an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Professional Component Content:
Math/Science: 0; Engineering: 3 credits; General Education: 0

Assessment Requirements:
Target questions

- Questions showing application of mathematics, science, and engineering (Outcome a)
- Questions showing engineering problem solving (Outcome e)

Student work samples

- Assignment showing use of computer programming language (Outcome k)

Student Course Survey

- Survey question showing analysis and interpretation of experimental data (Outcome b2)

Last Review:
December 18, 2007 by Jianchu (Jason) Yao