EEE202 Circuits I (4) [F,S]

Course Description:
Principles for analyzing linear and non-linear circuits. Utilization of SPICE and MATLAB. Design and measurement of linear analog electrical systems.
Lecture, laboratory. Required course.

Prerequisite:
EEE 101 (or equivalent).

Pre or Co-requisites:
MAT 274 (or 275), PHY 131.

Textbook:
J.D. Irwin, *Basic Engineering Circuit Analysis*, 8th Edition, John Wiley and Sons, 2002.

Supplemental Materials:
Laboratory handouts. PSpice for Windows books from various authors.

Coordinator:
ECEE Undergraduate committee

Prerequisites by Topic:
1. Ordinary differential equations
2. Physics: electricity and magnetism

Course Objective:
1. Students can apply basic analysis, design, and measurement of linear analog electrical systems and are aware of their importance across engineering disciplines
2. Students can use AC steady state analysis on linear circuits.
3. Students can use Laplace transforms to analyze linear circuits and characterize linear circuits

Course Outcomes:
1. Students are proficient in measurement of electrical systems.
2. Students can analyze complex dc and ac linear circuits both analytically and with PSpice.
3. Students can design simple linear electrical circuits.
4. Students can use AC steady state analysis to find currents and voltages within circuits driven by sinusoidal sources
5. Students can apply Laplace transforms correctly and appropriately to analyze linear circuits.
6. Students can relate pole and zero locations to characteristics of time-domain functions
7. Students understand the connection between linear circuits and differential equations.

Course Topics:
1. Basic quantities: circuit elements, power, passive sign convention (1 week)
2. Ohm's Law, Kirchhoff's Laws, Parallel and Series circuits, (1week)
3. Nodal and loop analysis techniques for dc and ac circuits; (2weeks)

4. Superposition, Thevenin's and Norton's Theorems (2 weeks)
5. Capacitors and inductors; circuits with energy storage elements (1 week)
6. First and second order circuits; transient response (2 week)
7. Phasors, Impedance, AC steady-state analysis (2 weeks)
8. General network characteristics; driving point and transfer functions; Poles and zeros; Bode plots (2 weeks)
9. Applications to passive filters (2weeks)

Computer Usage:
PSpice simulation of ac and dc circuits. MATLAB computational analysis for ODEs.

Laboratory:
1. Introduction and Basics EEE202
2. Using SPICE
3. Using the Multimeter
4. Making Electrical Connections
5. Some Circuit Models
6. The Oscilloscope
7. Linear and Nonlinear Circuits
8. Digital Temperature Instrumentation Design
9. Waveforms, WFGs and Oscilloscope

Assessment:
Through homeworks, quizzes, tests, laboratory and final exam.

Course Contribution to Engineering Science and Design:
EEE202contributes to engineering science through circuit analysis, problem solving, computer solutions, and applications of mathematics and physics.

Course Relationship to Program Outcomes:
a: contemporary circuit analysis techniques; use of differential equations and physics backgrounds;
b: Some design and problem solving methodologies within laboratory experiments.
Some modeling and design during lab experiments.
k: PSpice, LABVIEW and modern laboratory equipment;
d: Calss required for all engineering majors and laboratory teams are multidisciplinary.

Person(s) preparing this description and date of preparation: K. Tsakalis, September 8, 2008, June 2015.