Course Syllabus

ELCT 221 - CIRCUITS

Course Coordinator: Undergraduate Program Committee

Catalog Description: Analysis of linear ac circuits using complex variables. Nodal and mesh analysis, Thevenin and Norton transformations, linearity, superposition, use of math solvers, circuit simulations and computer-interfaced instrumentation.

Credit Hours: 3

Prerequisite(s) by course: C or better grade in MATH 142 and ELCT 102, and AESP 265 or D or better grade in ELCT 220

Prerequisite by topics: Electrical Charges & Forces, Current & Voltage, Ohm’s Law, Calculus

Required Textbook:
2) or cost-free version of the book downloadable from https://www.publishing.umich.edu/publications/ee/
3) Analog Discovery Kit 2 (https://store.digilentinc.com/analog-discovery-2-100msps-usb-oscilloscope-logic-analyzer-and-variable-power-supply/)

Learning Outcomes:
Students who successfully complete the course will be able to:
1. find the impedance of R-L-C circuits
2. solve problems on AC linear circuits using nodal and mesh analysis
3. solve problems on Thevenin and Norton transformation and power delivered to the load in linear R-L-C AC circuits.
4. find the transfer function of R-L-C circuits in a frequency range
5. use MATLAB (or equivalent) tool to solving mesh and nodal matrix equations, calculating voltages, currents, impedances and powers in linear circuits.
6. use SPICE simulations to build the schematics and generate frequency dependencies of currents and voltages in linear circuits.

Course Topics:
- Review: KCL, KVL, DC circuit analysis
- Sinusoidal (AC) Signals
- Capacitors and inductors in AC circuits
- Phasors and complex numbers
- Nodal and Mesh Analysis of AC circuits
- Thevenin and Norton transformations in AC circuits
- Superposition and Linearity Techniques
- Power in AC circuits
- Frequency response of RLC circuits
- SPICE simulations of RLC circuits
- Two-port networks, transfer functions Bode plots
- Magnetically Coupled Circuits, transformers
- Three-phase circuit

Course Contribution to Program Outcomes:
ELCT 221 contributes to an achievement of:
- Outcome 1 – an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- Outcome 6 – an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusion.
General Course Policies

Academic Integrity
Unless otherwise stated, assignments and examination work are expected to be the sole effort of the student submitting the work. Students are expected to follow the University of South Carolina Honor Code and they should expect that every instance of a suspected violation will be reported. Students found responsible for violations of the Code will be subject to academic penalties under the Code in addition to whatever disciplinary sanctions are applied.

Accommodating Disabilities
Reasonable accommodations are available for students with a documented disability. If you have a disability and may need accommodations to fully participate in this class, contact the Office of Student Disability Services: 777-6142, TDD 777-6744, email sasds@mailbox.sc.edu, or stop by LeConte College Room 112A. All accommodations must be approved through the Office of Student Disability Services.

Diversity
In addition to scheduling exams, I have attempted to avoid conflicts with major religious holidays. If, however, I have inadvertently scheduled an exam or major deadline that creates a conflict with your religious observances, please let me know as soon as possible so that we can make other arrangements.

Recommended Study Habits
- Read the assigned material before class.
- Bring thoughtful questions to class for discussion.
- Prepare for the exams in study groups.
- Take notes during class discussions and while completing reading assignments.

Deviations
Minor deviations from the syllabus are a normal part of any adaptive teaching and learning process.