ELEG 2103 ELECTRIC CIRCUITS I

Spring Semester 2000

Catalog Data: Introduction to circuit variables, elements, and simple resistive circuits. Analysis techniques applied to resistive circuits. The concept of inductance, capacitance and mutual inductance. The natural and step responses of RL, RC, and RLC circuits. Prerequisites: completion of the pre-professional curriculum. Corequisites: ELEG 2101L.

Textbook: *Electric Circuits*, Sixth edition, James W. Nilsson and Susan A. Riedel, Prentice Hall, 2000.

Reference: TBD

Coordinator: K. J. Olejniczak, Ph.D., P.E., Associate Professor of Electrical Engineering

Goal: To expose the student to the importance of DC circuit analysis in their electrical engineering career. To have all students master the student to the technical, practical and importance of DC circuit analysis.

Prerequisites by Topic

1. A familiarity with integro-differential equations
2. A firm grasp of algebra

Topics:

1. Circuit variables
   - Voltage, current, instantaneous power, energy, sign convention
2. Circuit elements
   - Voltage and current sources
   - Ohm's Law
   - Mathematical circuit models
   - Kirchhoff's Laws (KCL and KVL)
   - Analysis of DC circuits containing dependent sources
3. Simple resistive circuits
   - Resistors in series, parallel and Δ-Y transformation
   - Voltage and current division
4. Circuit analysis techniques
   - Node-voltage method, with and without dependent sources
   - Mesh-current method, with and without dependent sources
   - The node-voltage method vs. mesh-current method
   - Source transformations
   - Thévenin and Norton equivalent circuits
   - Maximum power transfer
   - Superposition
5. Inductance, capacitance and mutual inductance
   - Series-parallel combinations of inductance and capacitance

- Mutual inductance

6. RL and RC circuits
   - The natural and step responses of RL and RC circuits
   - General solution for the step and natural responses
   - Switching circuits
7. RLC circuits
   - The natural and step response of a series and parallel RLC circuit

Computer Usage:

Use of PSpice® and MATLAB® for required homework assignments and for checking homework solutions.

Estimated Content:

Engineering Science: 2.5 credits or 83%
Engineering Design: 0.5 credit or 17%

* Each class is 50 minutes and meets three times a week.