

## ELEG 2104 – ELECTRIC CIRCUITS I

### Credits and Contact Hours

Three credit hours, 45 hours of instructor contact

### Instructor's Name

Hameed Naseem

### Textbook

- Electric Circuits, James W. Nilsson and Susan A. Riedel, 9<sup>th</sup> Ed., Pearson/Prentice Hall, 2011.
- Electric Circuits I Laboratory Experiment Manual, University of Arkansas, 2013, Soft Copy.

### Specific Course Information

- a. Catalog description: 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.
- b. Pre-requisites or co-requisites: Corequisite: Lab component. Pre- or Corequisite: Math 2564.
- c. Required.

### Specific Goals for the Course

#### 1. Specific outcomes of instructions

2. Indicate the student outcomes listed in Criterion 3 addressed by the course
  - (a) Students are required to **apply knowledge of math** (e.g., solving coupled linear equations, matrix algebra, and calculus), **science** (e.g., concepts of charge, current, voltage, capacitance, energy, inductors, magnetic energy, etc.), **and engineering** (electrical engineering designs) in analyzing circuits.
  - (c) Students use PSPICE simulation tools in analyzing circuits mostly and **designing some simple circuits** in their HW assignments and prelabs.
  - (e) Students are required to **solve electrical engineering problems** as they learn to use circuit analysis tools and learn to use equipment and devices safely in the lab.
  - (j) Students are made aware of some **contemporary issues** relating to **sustainable electrical power generation** and the AC/DC debate in some lectures as well as the **importance of safety** in dealing with electrical equipment and circuits.
  - (k) Students learn **PSPICE** as an **engineering tool** besides learning various analysis techniques for designing engineering systems and subsystems.

### List of Topics Covered in Class (class time: 75 min.)

1. Introduction to Circuit Theory and Circuit Variables (2 classes)
2. Circuit Elements (2 classes)
3. Simple Resistive Circuits (4 classes)
4. Techniques of Circuit Analysis (6 classes)
5. Operational Amplifier (3 classes)
6. Inductors and Capacitors (3 classes)

7. Response of First-Order RL and RC Circuits (5 classes)
8. Natural and Step Responses of RLC Circuits (5 classes)

**List of Labs (Lab time: 170 min.)**

1. Laboratory 1: Lab conduct and Safety, Lab Report Requirements, and PSPICE
2. Laboratory 2: Power Supplies, Resistors, and Digital Multimeter
3. Laboratory 3: Voltage-Divider and Meter Loads
4. Laboratory 4: Measuring Resistance Using the Wheatstone Bridge Circuit
5. Laboratory 5: Node Voltage and Mesh Current Methods
6. Laboratory 6: Superposition and Thevenin Equivalent
7. Laboratory 7: Periodic Signals and the Oscilloscope Measurement Techniques
8. Laboratory 8: Operational Amplifier
9. Laboratory 9: Capacitors, Inductors, and Response of First-Order RL and RC Circuits
10. Laboratory 10: Natural and Step Response of RLC Circuits
11. Laboratory 11: Build your own charger from Kit — Soldering (Not Graded)