

## EEL 3111 Circuits 1

1. Credits: 3

2. **Text book, title, author, and year:** *Basic Engineering Circuit Analysis*, 10<sup>th</sup> edition, by J. D. Irwin and R. M. Nelms, John Wiley & Sons.

a. **Supplemental materials:** Handouts

3. **Specific course information**

a. **brief description of the content of the course:** Introductory to electric circuit analysis: passive and active sign conventions; Ohm's and Kirchhoff's laws; network analysis, theorems as applied to dc and ac circuits; basic op-amp circuits; single time constant transient analysis; prerequisites: MA 2012, PHY 2049

**Co-requisites:** MA 2012, PHY 2049  
c. **Required, elective, or selected elective:** Required

4. **Specific goals for the course**

**Specific outcomes of instruction:** The student will understand voltage, current, power and energy. The student will be able to apply Ohm's law and Kirchhoff's voltage and current laws. The student will be able to analyze linear circuits with resistors, capacitors, inductors and dependent sources. The student will learn the concept of DC and AC analysis. The student will be able to effectively communicate in writing answers to questions on tests.

5. **Brief list of topics to be covered**

Chapter 1 Basic Concepts

System of Units (SI)

Basic Quantities

Circuit Elements

Chapter 2 Resistive Circuits

Ohm's Law

Kirchhoff's Laws

Voltage and current division

Dependent Sources

Chapter 3 Nodal and Loop Analysis

Circuits with independent sources

Independent current sources

Independent voltage sources

Sources with dependent sources

Dependent current sources

Dependent voltage sources

Super nodes

Solution of matrix equations, MATLAB codes

Chapter 4 Skip

Chapter 5 Additional Analysis Techniques

Superposition

Thévenin and Norton's theorems

Maximum power transfer

Chapter 6 Capacitance and Inductance

Current-voltage relationships

Stored and dissipated energy and power

Chapter 7 Transient Analysis

First order circuits: RL and RC

Second order circuits: RLC

Chapter 8 AC Steady State Analysis

Sinusoids-phasors

Impedance and admittance

Time domain analysis

KVL and KCL using phasors

Chapter 9 Power Analysis

Average power