

EEL 3111 Circuits 1

1. **Credits:** 3

2. **Text book, title, author, and year:** *Basic Engineering Circuit Analysis*, 10th 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; phasor representations and sinusoidal steady state; real and reactive single phase power.
 - b. **Prerequisites:** MAC 2312, PHY 2049 **Co-requisites:** MAP 2302, MAC 2313
 - c. **Required, elective, or selected elective:** Required

4. **Specific goals for the course**

Specific outcomes of instruction: The student will understand the concepts of voltage, current, power and energy. The student will be able to understand and 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 linear dependent sources. The student will learn the concept of DC and AC analysis of linear circuits. The student will be able to effectively communicate in writing answers to qualitative 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

Power factor

Complex power

Power factor correction