

**J. Sargeant Reynolds Community College  
Course Content Summary**

**Course Prefix and Number:** EGR 251

**Credits:** 3

**Course Title:** Basic Electric Circuits I

**Course Description:** Teaches fundamentals of electric circuits. Includes circuit quantities of charge, current, potential, power, and energy. Teaches resistive circuit analysis; Ohm's and Kirchhoff's laws; nodal and mesh analysis; network theorems; RC, RL and RLC circuit transient response with constant forcing functions. Teaches AC steady-state analysis, power, and three-phase circuits. Presents frequency domain analysis, resonance, Fourier series, inductively coupled circuits, Laplace transform applications, and circuit transfer functions. Introduces problem-solving using computers. Part I of II. Prerequisites: MTH 264 and PHY 241 or equivalent. Lecture 3 hours per week.

**General Course Purpose:** This is a second-year course in the Engineering AS degree program.

**Course Prerequisites and Co-requisites:**

Prerequisites: MTH 264 and PHY 241 or equivalent

**Student Learning Outcomes:**

Upon completing the course, the student will be able to

- a. Demonstrate various methods of analyzing electric circuits;
- b. Identify the basic laws of electrical engineering and apply these laws to the time-domain analysis of electric circuits;
- c. Analyze AC circuits using phasor analysis;
- d. Design and analyze basic operational amplifier circuits; and
- e. Apply the Laplace transform to the frequency-domain analysis of electric circuits.

**Major Topics to Be Included:**

- a. Introduction to passive and active elements
- b. Resistive circuits
- c. Independent and dependent sources
- d. Nodal and mesh analysis
- e. Introduction to operational amplifiers
- f. Simple RC and RL circuits
- g. Second-order circuits
- h. Sinusoidal excitation and phasors
- i. AC steady-state analysis
- j. AC steady-state power
- k. Single-phase transformers
- l. Laplace transforms

**Date Created/Updated (Month, Day, Year):** January 25, 2019