Virginia Western Community College
EGR 271
Electric Circuits I

Prerequisites
MTH 264 and EGR 121

Course Description
Covers fundamentals of electric circuits. Teaches resistive circuit analysis methods, including network theorems. Features operational amplifiers, capacitors, inductors, resistor-capacitor (RC), resistor-inductor (RL) and resistance-inductance-capacitance (RLC) circuit transient response. Introduces phasor representation of alternating current (AC) circuits. Utilizes circuit design processes, technical writing and computer software for problem solving. Includes laboratory analysis to explore course concepts. Part I of II.

Semester Credits: 4 Lecture Hours: 3 Lab/Clinical/Internship Hours: 3

Required Materials

Textbooks:

Electrical Engineering, 7th Edition, Allan R. Hambley 2016, Pearson, ISBN 978013448414.

Other Required Materials:

Multi Sim Live (free) https://www.multisim.com/

General Course Purpose

EGR 271 provides fundamental skills in circuit analysis and design for resistive, resistor-capacitor (RC), resistor-inductor (RL), resistance-inductance-capacitance (RLC) and op amp circuits.

See: https://courses.vccs.edu/courses/EGR271-ElectricCircuitsI/detail

Course Outcomes

At the completion of this course, the student should be able to utilize the following:

- Electrical quantities
  - Define and calculate electrical quantities of charge, current, voltage, power and energy
- Resistive circuit analysis
  - Analyze resistive circuits by combining series and parallel resistance
  - Apply Ohm's Law, Kirchhoff's Voltage and Kirchhoff's Current Law in analyzing resistive circuits
  - Apply voltage division and current division to the analysis of resistive circuits
- Systems of equations
  - Apply techniques for solving systems of equations
  - Analyze circuits using node voltage and mesh analysis techniques
- Network Theorems
  - Use network theorems or network reduction techniques, such as superposition and Thevenin's Theorem, to analyze or simplify resistive circuits.
- Operational Amplifiers
  - Use linear models to represent operational amplifiers
  - Analyze operational amplifier circuits
  - Include applications of op amp circuits
- RC, RL, and RLC Circuits
  - Define basic properties of capacitors and inductors.
  - Define and calculate voltage, current, power and energy for capacitors and inductors.
  - Analyze RC and RL circuits with constant forcing functions
  - Analyze RLC circuits with constant forcing functions
- Phasors
  - Perform calculations using complex numbers (math)
  - Introduce the use of phasors to represent sinusoidal steady state signals, and circuit elements
- Lab Equipment Usage
  - Use a power supply and function generator as sources for circuit
  - Use a multimeter and oscilloscope to measure DC and AC quantities
- Lab Work
  - Design and build circuits to explore course topics
  - Design and build circuits based on specified criteria
  - Utilize simulation, programming environments, and lab equipment to analyze circuits and designs
  - Write clear, cogent, succinct technical reports

Topical Description

- Electrical quantities
- Resistive circuit analysis
- Systems of equations
- Network Theorems
- Operational Amplifiers
- RC, RL, and RLC Circuits
- Phasors
- Lab Equipment Usage
- Lab Work

Notes to Instructors

- All instructors teaching this course in any given semester will use the same textbooks.
- The content of this course will be updated every few years in collaboration with engineering faculty from across the VCCS.

ADA Statement (PDF)
Title IX Statement (PDF)