Virginia Western Community College
EGR 272
Electric Circuits II

Prerequisites
MTH 267 and EGR 271

Course Description
Covers sinusoidal steady-state circuit response using phasors, frequency analysis of linear circuits including frequency response, Bode plots, Fourier series analysis, and design of basic filters. Examines Laplace circuit analysis and transfer functions, AC power analysis, nonlinear diode models, and technical writing. Includes laboratory analysis and open-ended design project. Part II of II.

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

Required Materials

Textbooks:

Electric Circuits, 12th Edition, James W. Nilson and Susan Riedel, 2023, Pearson, ISBN-13: 9780137648221.

Other Required Materials:

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

General Course Purpose

EGR 272 builds on time-domain knowledge and skills introduced in EGR 271 Electric Circuits I, and develops frequency-domain and transfer function understanding, including application to design work.

See: https://courses.vccs.edu/courses/EGR272-ElectricCircuitsII/detail

Course Outcomes

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

- AC analysis
  - Represent circuits in the phasor domain, including impedance (review)
  - Calculate the sinusoidal steady-state response of a linear circuit, including op amps, at a specified frequency using phasors
  - Apply equivalent impedance, source transformation, superposition, node and mesh techniques, and Thevenin equivalent circuits for analysis and design
- Frequency domain
  - Determine the frequency response of a linear circuit
  - Illustrate the frequency response with Bode and phase plots
  - Represent a periodic function as a Fourier series
  - Apply the frequency response to periodic input signals
  - Analyze and design first and second order passive and active filters
- Laplace domain
  - Determine Laplace and inverse Laplace transforms
  - Represent circuits in the Laplace domain
  - Analyze circuits using Laplace Transform techniques
  - Determine and apply transfer functions
- AC power
  - Calculate the average and rms value of a periodic waveform
  - Calculate complex power, average real power, and reactive power
  - Calculate power factor for a complex load
- Nonlinear circuit models
  - Determine the operating point and small-signal response of diodes
- 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
- Design Project
  - Design and build a project based on open-ended criteria
- Modeling
  - Determine the limits and usefulness of models and approximations
  - Determine which approximations and assumptions are valid for a particular circuit or design

Topical Description

- AC analysis
- Frequency domain
- Laplace domain
- AC power
- Nonlinear circuit models
- Lab Work
- Design Project
- Modeling

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)