J. Sargeant Reynolds Community College
Course Content Summary

Course Prefix and Number: EGR 272 Credits: 4

Course Title: Electric Circuits II

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. Lecture 3 hours, Laboratory 3 hours, Total 6 hours per week. 4 credits

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.

Course Prerequisites/Corequisites:

MTH 267 and EGR 271

Course Objectives:
Upon completing the course, the student will be able to:

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

Major Topics to be Included:

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

Effective Date/Updated: August 1, 2023