1. ECE 202: Circuit Theory Applications

2. 4 credits: 2-75 minute lecture sessions/week, 1-100 minute lab/week.

3. Olivera Notaros

4. Fundamentals of Electric Circuits. Alexander, C. & Sadiku, M. 2017.

5. Course Information
    a. Basic circuit analysis techniques and applications to engineering design problems
    a. Prerequisites: ECE 103 with a C or higher
    b. Required

6. Goals for the Course
    a. Course Learning Objectives
        i. Integrate and differentiate simple sinusoidal, exponential, and logarithmic functions
        i. Apply rules and hand-calculate with complex numbers in rectangular, polar, and trigonometric forms
        ii. analyze source-free RL, RC, and RLC circuits
        iii. calculate step response of RL, RC, and RLC circuits
        iv. Understands operation of first and second order circuits
        v. Use mesh and node analysis to analyze circuits with independent and dependent sources
        vi. Apply superposition, source transformation, Thevenin and Norton theorems
        vii. Calculate instantaneous and average power
        viii. Use PQS triangle
        ix. Calculate transfer function and phase shift
        x. Express transfer function in Bode format and draw Bode plots
        xi. Calculate transfer function, cutoff and center frequency, bandwidth, quality factor
        xii. Perform magnitude and frequency scaling of a given filter
    b. Student Outcomes
        1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
        2. An ability to apply the engineering design process to produce solutions that meet specified needs with consideration for public health and safety, and welfare, as well as global, cultural, social, environmental, and economic factors
        3. An ability to communicate effectively with a range of audiences
        4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. An ability acquire and apply new knowledge as needed, using appropriate learning strategies

7. Topics Covered

First-order circuits and step response
Second-order circuits and step response
Sinusoids and phasors
Sinusoidal steady-state analysis
AC power analysis
Three-phase circuits
Magnetically coupled circuits
Frequency response and filters
Laplace Transform
CD Circuit Analysis
Filter Analysis