BAKER COLLEGE
STUDENT LEARNING OUTCOMES

EE2110 Circuits and Electronics I
4 Semester Hours

Student Learning Outcomes & Enabling Objectives

1. Use the fundamental 'building blocks' of electricity and circuitry.
    a. Describe basic electrical quantities: voltage, charge, current, resistance, conductance, impedance, admittance, energy, power, and the physical significance of each.
    b. Define units of measurement in the SI system for these quantities: volts, coulombs, amperes, ohms, siemens, joules, and watts.
    c. Describe practical and idealized two-terminal devices e.g. batteries, conductors, and resistors.
    d. Describe the properties of dependent and independent voltage and current sources.
2. Analyze DC Circuits (Linear Passive Networks)
    a. Introduce the topology of electric circuits: nodes, branches, loops, and meshes.
    b. Solve circuits using Kirchhoff's Voltage Law (KVL) and Kirchhoff's Current Law (KCL)
    c. Solve circuits using nodal analysis and mesh analysis.
    d. Solve circuits using network theorems: Superposition, Thevenin, and Norton.
3. Analyze and design active circuits using Operational Amplifiers
    a. Detail the ideal model of the op-amp, e.g. infinite gain, differential inputs, virtual short.
    b. Analyze and design inverting amplifiers, summing amplifiers, difference amplifiers, and voltage followers.
4. Analyze and design digital circuits.
    a. Explain the difference between digital and analog quantities.
    b. Introduce binary code and binary arithmetic.
    c. Design digital circuitry using logic gates.
    d. Apply the basic laws and rules of Boolean algebra and introduce DeMorgan's theorems to Boolean expressions.
5. Model and solve circuits with energy-storage elements (RC and RL First Order Circuits)
    a. Use mathematical functions to describe several types of non-periodic waveforms.
    b. Define the electrical properties of a capacitor, including its i-v relationship and energy equation.
    c. Combine multiple capacitors when connected in series or in parallel
    d. Define the electrical properties of an inductor, including its i-v relationship and energy equation.
    e. Combine multiple inductors when connected in series or in parallel.

    f. Analyze transient responses of RC and RL circuits.
6. Model and solve second order series and parallel RLC circuits
    a. Design and analyze series and parallel RLC circuits using dc sources and switches.
    b. Demonstrate the transient response of RLC circuits and distinguishing between overdamped, critically damped and underdamped responses.

Laboratory Student Learning Outcomes and Enabling Objectives

7. Demonstrate proper use of electronics equipment:
    a. wiring breadboards and reading circuit schematics;
    b. sources such as DC power supplies and function generators;
    c. measurement equipment such as digital multi-meters and oscilloscopes;
    d. NI Elvis II system and NI Multisim Software.
8. Identify electrical and electronic components.
    a. Identify reference marks, color codes, and polarity marks.
    b. Use data sheets and specifications.
9. Write professional laboratory reports using quality technical writing skills.
    a. Create well-formatted and –labelled graphs and diagrams.
    b. Compose clear, technically sound reports using conventional engineering nomenclature.

These SLOs are/are not approved for experiential credit.

Effective: Fall 2019