COURSE OUTLINE

ELEC-107
Introduction to Electronics Circuit

4 Semester Hours

HOWARD COMMUNITY COLLEGE

Description

Upon completion of this course, the student will have a thorough understanding of fundamentals of electronics. The student will study passive components and their behavior in DC circuits as well as in AC circuits. The student will learn fundamental laws that govern the electronics circuits such as Ohm's law, Kirchhoff's current/voltage laws, and Thevenin's Theorem. Analysis of electric circuits with computer techniques will be covered as part of laboratory experiments. Basic electronics safety will be stressed. The student will have hands-on experience and a good understanding of laboratory test instruments and basic troubleshooting techniques. Prerequisite: Eligible to enroll in MATH-061. (3 hours lecture, 3 hours lab)

Overall Course Objectives

Upon completion of this course, the student will be able to:

1. Convert engineering notation to metric prefix and vice-versa by using scientific calculator.
2. Operate basic laboratory instruments and test instruments such as power supply, VOM, and DMM.
3. Apply basic electronics laws to compute current and power (Ohm's law and Kirchhoff's laws).
4. Compare series/parallel circuit characteristics and apply voltage divider formula to a series circuit and analyze series/parallel circuits combination.
5. Operate dual trace oscilloscope to measure sinewave peak voltage, peak-to-peak voltages and frequency.
6. Interpret how passive components (capacitors and inductors) behave in DC circuits and in AC circuits.
7. Test resonant circuits and ploy resonance characteristics.
8. Compare and contrast network theorems such as Thevenin, superposition and maximum power transfer.
9. Analyze circuits using computer software.
10. Identify the basic operations of a transformer and various types of transformers and their applications.
11. Analyze the operation of resonant circuits and determine bandwidth or resonant circuits.

Major Topics

1. Basic DC circuit concepts

    a. Engineering notation metric prefix
    b. Conversion of scientific notation to metric using calculator
    c. Build a simple DC circuits and apply Ohm's law
    d. Compute current, power and energy
    e. Read resistor color code

2. Series, parallel and series/parallel circuits

    a. Find total resistance when they are in series and compute total current
    b. Apply voltage divider formula to a series circuits
    c. Find total resistance when they are in parallel and compute branch currents
    d. Analyze simple series-parallel combination circuits
    e. Apply troubleshooting skills to series-parallel circuits

3. Basic AC circuits concepts

    a. Dual trace oscilloscope operation
    b. Measure sinewave peak voltage, peak-to-peak voltage, and frequency using dual trace oscilloscope
    c. Capacitors and inductor operation and their behavior in DC and AC circuits
    d. Resonant circuits and their applications
    e. Compute current, voltage and power
    f. Calculate total impedance and branch currents

4. Circuit Theorems

    a. SuperPosition Theorem
    b. Thevenin's Theorem
    c. Norton's Theorem
    d. Maximum Power Transfer Theorem
    e. Computer Analysis

5. Measurement of Sinusoidal Waveform Using an Oscilloscope

    a. Voltage and Current Values of a Sine Wave
    b. Sine Waveform Characteristics
    c. Display and Measurement of Waveforms

Course Requirements

Grading/exams: Grading procedures will be determined by the individual faculty member but will be calculated on the basis of tests, lab reports, quizzes and final exam. This course includes a comprehensive final exam.

Writing: Each week, students are expected to write a laboratory report after performing that week's assigned experiments.

Other Course Information

This course is a course in the Biomedical Engineering Technology, Electronics Technology and Telecommunications Technology Programs.