

# **COURSE OUTLINE**

**ENES-150**

**Electronics and Instrumentation**

3 Semester Hours

## **HOWARD COMMUNITY COLLEGE**

### **Description**

This course is designed for the student who plans to transfer to an engineering program. It is primarily intended for students in mechanical engineering topics covered, including the following: modern instrumentation, basic circuit design, standard microelectronic circuits, digital data acquisition and control, signal conditioning, instrumentation interfacing, and design and testing of analog circuits. Laboratory sessions. Prerequisite: PHYS-112. (2 hours lecture, 2 hours lab)

### **Overall Course Objectives**

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

1. Discuss the variables in a network and explain their relationships.
2. Apply Ohm's Law and Kirchhoff's Laws to determine unknown voltages and currents.
3. Solve for the equivalent resistance of a network of series/parallel connections of resistors.
4. Compute the equivalent capacitance or inductance of series/parallel connections.
5. Use measurement procedures to determine values of network variables.
6. Analyze DC circuits, using node or mesh equations.
7. Analyze AC circuits, using sinusoidal functions and phasors.
8. Apply the superposition, Thévenin's and Norton's theorems to analyze networks.
9. Analyze the transient behavior of circuits, using (1<sup>st</sup> and 2<sup>nd</sup> order) differential equations.
10. Analyze the behavior of various Op Amp circuits.
11. Determine the characteristics of various passive filters and resonance circuits.
12. Analyze electronic circuits (rectifiers, amplifiers, etc.).
13. Apply logic design methods to analyze digital circuits.
14. Use Op-Amps in various applications.
15. Discuss the structure and operation of a microprocessor.
16. Discuss the circuitry and function of computer peripheral devices.

## **Major Topics**

1. Basic Concepts and Definitions
2. DC Circuits
3. Transient Analysis
4. RC Steady State Analysis
5. Steady State Power Analysis
6. Network Frequency Characteristics
7. Basic Electronics
8. Semiconductors
9. Transistors
10. Op-Amps
11. Digital Logic
12. Microprocessors

## **Other Course Information**

This course is an Arts and Sciences elective.