

COURSE OUTLINE
ENES-206
Fundamental Electric and Digital Circuit Laboratory
2 Credits

HOWARD COMMUNITY COLLEGE

Description

This course provides an introduction to basic measurement techniques and electrical laboratory equipment such as power supplies, oscilloscopes, and voltmeters. Students will design, simulate, and construct circuits containing passive elements, operational amplifiers and digital integrated circuits. Both transient and steady-state responses of these circuits will be studied. Prerequisite: ENES-244; Co-requisite: ENES-204. (1 hour lecture, 3 hours lab)

Overall Course Objectives

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

1. Use basic test and measurement equipment necessary to evaluate the performance of simple circuits.
2. Explain basic limitations, inaccuracies, and tolerances of the test equipment, components, and procedures.
3. Design circuits with efficient reliability, and cheaply achieve the desired results.
4. Identify techniques for drawing circuits and wiring diagrams, bread boarding circuits, and trouble shooting circuits.
5. Use simulation tools to design circuits and analyze performance.
6. Operate an Oscilloscope, Power Supply, Digital Multimeter and Sweep Generator.
7. Link test equipment with software and hardware.
8. Compare simulation with measured results.
9. Document results in industry-recognized report format.
10. Use Thevenin theorem and mesh analysis in order to design, characterize and operate simple circuits.
11. Apply knowledge of digital logic design to build circuits, switching circuits, sequence analyzers and decoders.
12. Describe the deviation from ideal performance of existing op-amp, oscillator, resistor, capacitor, inductor and digital logic components.

Major Topics

- I. Measurement Equipment
- II. Asynchronous Counters
- III. Switching Circuits
- IV. Adder Circuits
- V. Encoders and Display
- VI. Sequence Analyzers
- VII. Thevenin Equivalent Circuits

- VIII. Analog-to Digital Converters
- IX. Non-ideal Passive Components
- X. Rectifier Circuits
- XI. Transient Response
- XII. Op-Amp Circuits
- XIII. Passive and Active Filter Designs

Course Requirements

Grading/exams: Grading procedures will be determined by the individual faculty member. Grades will be based on circuit design, simulation, test equipment, and circuit performance measurement and documentation.