

## **ELEI/ENSC 204**

### **Introduction to Digital Electronics**

3 Credits (3 lecture hours, 1 lab hour)

## Community College of Baltimore County Common Course Outline

### **Description**

**ELEI/ENSC 204 - Introduction to Digital Electronics:** explores the theory and operation of the basic building blocks of digital electronics. Students examine number systems, Boolean algebra, logic functions and gates, minimization techniques, decoders, encoders, multiplexers, arithmetic circuits, latches, flip-flops, counters, and shift registers. The electrical characteristics of gates, timing, and hazards are observed.

**Co-requisite:** ELEI/ENSC 114

### **Overall Course Objectives**

Upon completion of this course, students will be able to:

1. describe basic digital terminology, components, and systems;
2. apply digital circuit theory in a laboratory setting as it is applied to a work situation;
3. distinguish between digital and analog systems;
4. explain the basics of Boolean logic operations and algebra;
5. evaluate logic circuit outputs;
6. describe the operation of logic gates;
7. write truth tables for logic gates;
8. apply Karnaugh maps;
9. convert the following number bases: decimal, binary, octal, and hexadecimal;
10. explain the operation of D Flip-Flop, J-K Flip-Flop, and Flip-Flop used as a shift register;
11. describe the operation of asynchronous and synchronous counters;
12. synthesize a circuit in a field programmable logic array (FPGA);
13. explain simple Register Transfer Language (RTL) descriptions;
14. illustrate the operation of encoders, decoders, multiplexers, shift registers, and wave generating circuits; and
15. describe the characteristics of gates, timing, and hazards.

### **Major Topics**

- I. Digital and Analog Systems
- II. Number Systems and Codes
- III. Logic gates, Boolean Algebra, and Truth Tables
- IV. Boolean Theorems
- V. DeMorgan's Theorem
- VI. Combinational Logic Circuits

- VII. Flip-Flops
- VIII. Asynchronous Inputs
- IX. Digital Arithmetic Operations and Circuits
- X. The Complement System of Addition and Subtraction
- XI. Electrical Characteristics and Timing

### **Course Requirements**

Grading will be determined by the individual faculty member, but shall include the following, at minimum:

- Five homework assignments
- Two exams
- Three lab assignments
- Final exam

### **Other Course Information**

Components of this course are taught in an electronics lab.

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