

STATE UNIVERSITY OF NEW YORK
COLLEGE OF TECHNOLOGY
CANTON, NEW YORK

COURSE OUTLINE

ELEC 165 Digital Fundamentals & Systems

Prepared By: Stephen E. Frempong

SCHOOL OF ENGINEERING TECHNOLOGY
SCIENCE & ENGINEERING TECHNOLOGY DEPARTMENT
SPRING 2009

ELEC 165 – Digital Fundamentals & Systems

- A. TITLE: Digital Fundamentals & Systems
- B. COURSE NUMBER: ELEC 165
- C. CREDIT HOURS: 3
- D. WRITING INTENSIVE COURSE: NO
- E. WEEKS PER SEMESTER: 15
- F. SEMESTER OFFERED: FALL
- G. HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY: 3 hours of lecture per week.
- H. CATALOG DESCRIPTION: This course discusses: Number Systems, Operations and Codes, Logic Gates, Boolean Algebra and Logic Simplification, Combinational Logic Analysis, Functions of Combinational Logic, Latches, Flip-Flops, Timers, and Counters.
- I. PRE-REQUISITES: ELEC 101 [Electric Circuits I], ELEC 109 [Electric Circuits I lab], or permission of instructor.
- J. GOALS (STUDENT LEARNING OUTCOMES)

By the end of this course, the student will be able to:

1. Recognize various instruments and understand how they are used in measurement and troubleshooting digital circuits and systems
2. Describe programmable logic, discuss the various types, and describe how PLDs are programmed
3. Make basic comparisons between the major IC technologies – CMOS and bipolar TTL
4. Design logic circuits using NAND, NOR, NOT, AND, OR, and ect.
5. Simplify expressions by using the laws and rules of Boolean algebra, DeMorgan, and Karnaugh mapping
6. Design counter circuits
7. Analyze counter circuits

- K. TEXTS:
Thomas L. Floyd, Digital Fundamentals, 10th Edition,
Upper Saddle River, New Jersey: Prentice Hall, 2009.

- L. EQUIPMENT: Technology Enhanced Classroom
- M. GRADING METHOD: A-F
- N. MEASUREMENT CRITERIA/METHODS: Examination performance and class participation
- O. DETAILED TOPICAL OUTLINE:
1. Number Systems, Operations, and Codes
 - a. Decimal Numbers
 - b. Decimal-to-Binary Conversion
 - c. Binary Arithmetic
 - d. Hexadecimal Numbers
 - e. Octal Numbers and BCD
 2. Logic Gates
 - a. The Inverter
 - b. The OR, NAND and NOR
 - c. The Exclusive-OR and Exclusive-NOR gates
 3. Boolean Algebra and Logic Simplification
 - a. Boolean Operations and Expressions
 - b. Laws and Rules of Boolean Algebra
 - c. DeMorgan's Theorems
 - d. Boolean Analysis of Logic Circuits
 - e. Simplification Using Boolean Algebra
 - f. Boolean Expression and Truth Tables
 - g. The Karnaugh Map
 4. Combinational Logic Analysis
 - a. Implementing Combinational Logic
 - b. The Universal Property of NAND and NOR gates
 - c. Combinational Logic Using NAND and NOR gates
 - d. Logic Circuit Operation with Pulse Waveform Inputs
 5. Functions of Combinational Logic
 - a. Adders
 - b. Comparators
 - c. Decoders
 - d. Encoders
 - e. Code Converters
 - f. Multiplexers and De-multiplexers
 - g. Parity Generators/Checkers

6. Latches, Flip-Flops, and Timers
 - a. Latches
 - b. Flip-Flops
 - c. Multivibrators

7. Counters
 - a. Asynchronous Counters
 - b. Synchronous Counters
 - c. Up/Down Synchronous Counters
 - d. Design of Synchronous Counters
 - e. Cascaded Counters
 - f. Counter Decoding
 - g. Counter Applications