

**Texas A&M University–Corpus Christi**  
**College of Science and Technology**  
**Engineering Technology**

**Course Number and Title:** ENTC 3416 Digital Logic

**Weekly Schedule:** 3 hours lecture and 3 hours laboratory

**Prerequisites:** ENTC 3415 Circuit Analysis II

**Course Description:**

This course introduces the principles of digital logic analysis and design: Topics include logic functions, logic gates, number systems and conversions, Boolean algebra, logic simplification, combinational circuits, programmable logic devices, and sequential circuits. The laboratory provides hands-on experience with devices and circuits discussed in the classroom.

**Textbooks**

1. Digital Fundamentals, Thomas Floyd, 7th Edition, 2000, Prentice Hall.
2. Experiments in Digital Fundamentals, David Buchla, 5th Edition, 2000, Prentice Hall.

**Course Objectives**

This course is designed to enable students to:

- Convert between decimal, binary, octal and hexadecimal numbers.
- Perform addition and subtraction in the four bases studied (10, 2, 8, and 16). Use various codes, ex. ASCII, gray code, BCD, etc.
- Derive and simplify Boolean expressions.
- Use a wide range of digital chips, from simple AND, OR, NOT, NAND and NOR gates to adders, subtractors, decoders, and multiplexers.
- Identify basic flip-flop types (D, T, S-R and J-K) and clocking variations (edge-triggered, master-slave, and transparent).
- Interpret timing diagrams of flip-flops.
- Analyze circuits derived from flip-flops, ex. counters and shift registers.
- State basic differences between TTL and CMOS.
- Build, test, and troubleshoot digital circuits.
- Use a software package to analyze and design digital circuits.

**Assessment**

	Points		If	Grade
Quiz	5		$90 \leq \text{Total} < \text{XX}$	A
Midterm 1	20		$80 \leq \text{Total} < 90$	B
Midterm 2	20		$70 \leq \text{Total} < 80$	C
Lab Experiments	20		$60 \leq \text{total} < 70$	D
Homework	10		$\text{xx} < \text{Total} < 60$	F
Final	25			
Total	100			

**Topics Covered**

Digital concepts, Number systems and codes, Logic Gates, Boolean algebra, Logic simplification, Combinational logic, NAND and NOR circuits, Combinational logic circuits, PLD arrays and classifications, PALs, PLAs, and GALs, Flip-flops, one-shots, timers, Counters Shift registers, Integrated Circuit Technologies.

**Laboratory Exercises/Experiments:**

- Lab 1 Constructing a Logic Probe
- Lab 3 Number Systems
- Lab 4 Logic Gates
- Lab 5 Boolean Laws & DeMorgan's Theorem
- Lab 6 Logic Circuit Simplification
- Lab 7 The Perfect Pencil Machine –Design
- Lab 8 The Perfect Pencil Machine - Build and Demo
- Lab 9 Adder and Magnitude Comparator
- Lab 10 Combinational Logic Using Multiplexers
- Lab 11 Combinational Logic Using Demultiplexers
- Lab 12 The D Latch and D Flip-Flop
- Lab 13 The J-K Flip-Flops

**Prepared by:** Ray Bachnak

**Date:** \_\_\_\_\_