EMBRY-RIDDLE AERONAUTICAL UNIVERSITY
Department of Computing and Mathematics
COURSE OUTLINE FOR

Course No.: CEC220 **Title: Digital Circuit Design**
Cr Hrs: 3

Lecture Hours: 3

COURSE DESCRIPTION:

This course is an Introduction to logic design and interfacing digital circuits. Presented are basic concept of digital logic and design such as Boolean algebra, basic logic gates, combination logic circuits, signal timing, digital multiplexers, circuit minimization techniques, Flip-Flop storage elements, shift registers, counting devices and sequential logic circuits. Corequisite CEC222 (Laboratory)

GOALS:

The purpose of the course is to have students acquire an understanding of digital circuits, understand numbering system, understand Boolean algebra, understand digital signal timing, be able to design complex digital circuits, appreciate the role of hardware in computer operations; understand and use ICs in the design of the digital circuits and to be able to apply digital systems in a real life applications.

PERFORMANCE OBJECTIVES:

1. Understand numbering systems (binary, hex, etc.)
2. Conversion between numbering systems.
3. Understand Boolean algebra and simplify Boolean expressions.
4. Implement digital circuits using Boolean expressions.
5. Understand basic logic gates and their functions.
6. Construct truth tables.
7. Analyze electronic circuits.
8. Understand Integrated Circuits.
9. Understand device data sheets.
10. Understand Flip-Flops, decoders, multiplexers, adders, Comparators, shift registers and be able to use them in a design.
11. Explain The operation of the above circuits.
12. Understand Combination and Sequential logic.

13. Understand programmable Logic Devices.

14. Understand timing and timing diagram of logic devices and circuits.

Department of Computing and Mathematics
COURSE OUTLINE FOR CEC220, Continued

TEXTBOOK:

Floyd, L.. Thomas, *Digital Fundamentals, seventh edition*, Prentice Hall, 2000.

SUGGESTED SUPPLEMENTAL MATERIALS:

a) Baumgarter, W.H., *Pulse Fundamentals in Small Scale Digital Circuits*, Reston Publishing.
b) Garrod & Borns, *Digital Logic Analysis, Application & Design*. Sanders Collage Publishing 1991.
c) *Practical Digital Design Using IC's*, Grrenfield, Prentice Hall
d) *Digital Logic Circuit Analysis & Design*, Victor P. Nelson, etc. Prentice Hall 1995
e) Search the World Wide Web for related materials in Digital Circuit Design.

PREREQUISITE KNOWLEDGE BY TOPIC:

1. Collage algebra

	TOPIC	CLASS HOURS	COURSE OBJECTIVES
1.	Introductory Digital Concepts	2	Understand the overall concept of Digital systems, signals, Logic levels, timing diagrams and ICs.
2.	Number systems, Operations, and Codes	4	Understand the different numbering systems such as Binary, Hexadecimal, Decimal and Octal. Be able to do arithmetic operations in different numbering system. Understand different numbering codes such as ASCII, Gray, and BDC.
3.	Logic Gates	3	Understand the symbols and operations of basic logic gates and their characteristics.
4.	Boolean Algebra and Logic Simplification	2	Understand the concept and rules of Boolean algebra and how it is used for logic circuit simplification.
5.	Karnaugh Map	2	Understand Karnaugh Map and be able to construct and use it for logic circuit simplifications.
6.	Combination Logic	3	Understand how logic gates are used to construct combination logic devices. Understand the functions and characteristics of combination logic circuit.
7.	Functions of Combination Logic	3	Understand the functions of adders, decoders, and other combination logic devices and be able to use the ICs in the implementation of a logic circuit.
8.	Flip-Flops and Related Devices	4	Understand concept of a Latch and different types of Flip-Flops and their applications.

	TOPIC (cont.)	CLASS HOURS	COURSE OBJECTIVES (cont)
9.	Counters and Shift Registers	3	Understand the synchronous and asynchronous counters, state diagrams, shift registers and be able to use them in applications
10.	Programmable Logic Devices	3	Understand the logic of programmable arrays and the major types of PLDs. Understand PALs and GALs.
11.	Sequential Logic Application of PLDS	3	Understand sequential logic and how it differs from combination logic. Be able to implement sequential logic in a control system.
12.	Memory and Storage	3	Understand a basic memory characteristics and different types of memory and how they work.
13.	Interfacing	3	Understand digital to analog and analog to digital conversion. Understand the concept of the BUS and serial and parallel transmission.
14.	Neglected Topics	3	Introduction to microprocessors. Discussion of a topic in modern computer technology.

COMPUTER USAGE:

Access to the computer lab with Logic circuit Simulators such as Electronic Work Bench (EWB), Logic Works and Xilinx..

GRADING SYSTEM:

1. Two mid-term and the final test (all comprehensive, covering the entire material covered)
2. Quizzes: 4-6 short (unannounced) quizzes given at the end of lecture or beginning of the labs to check the class progress.
3. Grading Percentages: midterms 50%, quizzes 15%, Final exam 35%

ESTIMATED CONTENT:

Skills: 30 %
Content: 70 %