MARICOPA COMMUNITY COLLEGES

Digital Logic and Circuits

Course: **ELE131**	Lecture **3** Credit(s) **3** Period(s) **3** Load
	Laboratory **0** Credit(s) **3** Period(s) **2** Load
First Term: **2004 Fall**	Course Type: **Occupational**
Final Term: **Current**	Load Formula: **S**

Description: Number systems, binary arithmetic, and Boolean algebra, combinational and sequential logic circuits, and memory elements

Requisites: Prerequisites: Score of 19 on Technical Mathematics placement test or Grade of C or better in GTC107 or MAT082 or equivalent.

MCCCD Official Course Competencies

1. Describe the fundamentals of digital logic. (I)
2. Use logic symbols and truth tables to describe basic gates. (II)
3. Describe the various logic families and interfacing considerations between families. (II)
4. Apply laws of Boolean algebra to logic problems. (III)
5. Use Boolean algebra to simplify combinations of logic gates. (III)
6. Use Karnaugh maps, DeMorgan`s theorems, and rules of Boolean algebra to analyze combinational logic circuits. (IV)
7. Implement Boolean expressions using logic gates. (IV)
8. Describe, implement, and measure combinational logic circuits incorporating commonly used integrated circuits. (V)
9. Explain the functional operation and characteristics of the flip-flog as a logic device. (VI)
10. Describe, implement, and measure sequential logic circuits incorporating commonly used integrated circuits. (VI, VII, VIII)
11. Use timing diagrams to analyze sequential logic circuits. (VI, VII, VIII)
12. Identify the types and applications of various memory devices. (IX)
13. Discuss the characteristics of digital memory elements. (X)
14. Apply the scientific method of inquiry and deduction relating to the laws, theories, and axioms of digital logic circuitry to specific laboratory experiments.

MCCCD Official Course Outline

I. Overview of Digital Logic
   A. Logic levels and pulse waveforms
   B. Elements and functions of digital logic
   C. Levels of digital integrated circuits
   D. Digital testing and troubleshooting instruments

II. Logic Gates
  A. The three basic logic gates, and, or and not
  B. The nand and nor gate
  C. Operating characteristics of logic families
III. Boolean Algebra
  A. Rules, laws and DeMorgan`s theorem for Boolean algebra
  B. Simplification of Boolean expressions for gate networks
  C. The Karnaugh map
IV. Combinational Logic
  A. Analysis and design of combinational logic circuits
  B. The universal property of the Nand and Nor Gate
  C. Pulsed operation and troubleshooting
V. Functions of Combinational Logic
  A. Adders and comparators
  B. Encoders, decoders and code converters
  C. Multiplexers and emultiplexers
  D. Parity generators/checkers
VI. Flip-Flops and Other Multivibrator
  A. Latches and edge-triggered flip-flops
  B. Master-slave flip-flops
  C. Operating characteristics and applications
  D. One-shots and astable multivibrators
VII. Counters
  A. Asynchronous counters
  B. Synchronous counters
  C. Up/down and cascaded counters
  D. Counter decoding and applications
VIII. Shift Registors
  A. The four basic configurations of shift registers
  B. Biderectional shift registers
  C. Shift register counter and applications
IX. Memories
  A. Read-only memories (ROM`s and PROM`s)
  B. Read/write random access memories (RAM)
  C. Special memory devices
  D. Memory applications
  C. Shift register counters and applications
X. Memories
  A. Read-only memories (ROM`s and PROM`s)
  B. Read/write random access memories (RAM)
  C. Special memory devices
  D. Memory applications

Last MCCCD Governing Board Approval Date: **4/27/2004**

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