COCONINO COMMUNITY COLLEGE
COURSE OUTLINE

Created by: Doug Fitzpatrick Date: January 14, 2020
Dr Chad Davies
Effective Term: Fall 2020

A. **Identification:**

1. Subject Area: Engineering (EGR)
2. Course: 110
3. Course Title: Introduction to Digital Logic
4. Credit Hours: 4
5. Catalog Description: Pre-requisites or Co-requisites MAT 187 or higher. Design of digital sub-stems using individual components, MSI and LSI circuits, design of state machines. Three lecture. Three lab.

B. **Course Goals:**

To prepare students for in the foundations of digital logic necessary for studies in the design of microprocessors and other computer hardware. The course provides preparation to design digital subsystems using individual components, medium scale integration, large-scale integration circuits, and state machines.

C. **Course Outcomes:**

Students will be able to:

1. Convert between basic numbering systems such as decimal, hexadecimal and binary.
2. Perform arithmetic operations using signed and unsigned numbers in binary and hexadecimal.
3. Simplify algebraic expressions using Boolean Algebra.
4. Generate and use truth tables and canonical forms of Boolean expressions.
5. Convert expressions from Boolean form to electronic logic gates.
6. Use Karnaugh Maps to simplify Boolean expressions.
7. Interpret schematics, build and debug circuits containing MSI devices such as decoders, encoders, multiplexers, demultiplexers, and adders.
8. Use flip flops and latches to generate timing diagrams given the inputs to dese devices.
9. Design electronic counters and state machines.

ABET Learning Outcomes supported by this class. Each student will be able to:

1. identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

3. communicate effectively with a range of audiences
4. recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. acquire and apply new knowledge as needed, using appropriate learning strategies.

D: **Course Outcomes Assessment**

Student assessment is accomplished using assignments, exams, and labs.

E. **Course Content:**

Will include:

1. Introduction to numbering systems
2. Boolean algebra and logic gates
3. Boolean theorems and algebraic forms
4. Karnaugh Maps – minimization of Boolean functions
5. Combinational circuit analysis and design I
6. Gate delays and timing diagrams, hazards in combinational logic
7. Binary arithmetic and Arithmetic circuit
8. Modular Circuits
9. Latches and flip-flops
10. Registers and Counters
11. Analysis of clocked sequential circuits
12. Derivation of state graphs and tables
13. Design an n-bit ALU
14. Design of binary multiplier and divider
15. State machine design with SM Charts