

Course discipline/number/title: ENGR 1152: Logic Design

A. CATALOG DESCRIPTION

1. Credits: 4
2. Hours/Week: 3 Lecture, 2 Lab
3. Prerequisites (Course discipline/number): MATH 1115 or higher
4. Other requirements: None
5. MnTC Goals (if any): NA

B. COURSE DESCRIPTION: This course covers fundamental digital circuit design. Topics include truth tables, Boolean algebra, Karnaugh maps, logic gates, digital devices, sequential systems, flip-flops, counters, and design involving these elements. The accompanying laboratory provides hands-on experience designing, building, and testing digital circuits. Math 1115 may be taken concurrently.

C. DATE LAST REVISED (Month, year): February, 2025

D. OUTLINE OF MAJOR CONTENT AREAS:

1. Mathematical background
  - a) Number systems
  - b) Truth tables
  - c) Boolean algebra
  - d) Karnaugh maps
2. Logic gates
  - a) Basic logic circuits
  - b) Encoders and decoders
  - c) Multiplexers and demultiplexers
3. Sequential systems
  - a) Analysis
  - b) Design
  - c) Simplification
  - d) Timing analysis
4. State tables and state diagrams
5. Circuit elements
  - a) Flip flops
  - b) Counters
  - c) Shift registers
6. Programmable logic devices
7. Laboratory
  - a) Measurements
  - b) Breadboards
  - c) Circuit creation from a design
  - d) Troubleshooting

E. LEARNING OUTCOMES (GENERAL): The student will be able to:

1. Perform basic arithmetic operations in various number systems.
2. Apply basic Boolean postulates to simplify Boolean expressions.
3. Apply Karnaugh maps to simplify Boolean expressions.
4. Analyze and design various combinational logic circuits.
5. Analyze and design various sequential logic.

F. LEARNING OUTCOMES (MNTC): NA

G. METHODS FOR EVALUATION OF STUDENT LEARNING: Methods may include but are not limited to:

1. Objective exams
2. Lab exams

- G. METHODS FOR EVALUATION OF STUDENT LEARNING: Methods may include but are not limited to: Continued.
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  - 3. Quizzes
  - 4. Written homework
  - 5. Online homework
  - 6. Small group projects
  - 7. Oral presentations
  - 8. Laboratory reports
- H. RCTC CORE OUTCOME(S). This course contributes to meeting the following RCTC Core Outcome(s):  
Critical Thinking. Students will think systematically and explore information thoroughly before accepting or formulating a position or conclusion.
- I. SPECIAL INFORMATION (if any):
- 1. Scientific calculator or equivalent is required.