

The University of Texas at Tyler
Department of Electrical Engineering

EENG 3302: Digital Systems (required)

Syllabus

Catalog Description:

EENG 3302: Digital Systems
Boolean algebra, logic gates; number systems and codes; combinational logic; sequential logic; design of logic circuits; analog-digital interface; memory devices. Two hours of lecture and one three-hour lab per week.

Prerequisites: MATH 2413 Calculus I

Credits: 3 (2 hours lecture, 1 hours laboratory per week)

Text(s): Thomas L. Floyd, **Digital Fundamentals, 11th ed.** Prentice Hall, 2015
ISBN-10: 0132737965 ISBN-13: 9780132737968

Additional Material: NI Multisim Software <https://www.studica.com/National-Instruments-students-ni-labview-mydaq/multisim-student-edition.html>
NI Labview Software https://www.studica.com/us/en/National-Instruments-students-ni-labview-mydaq/labview-student-edition/779252-02_3.html

Course Coordinator: Mukul V. Shirvaikar, Professor

Topics Covered: (paragraph of topics separated by semicolons)

Introductory Digital Concepts; Number Systems, Operations, and Codes; Logic Gates; Boolean Algebra and Logic Simplification; Karnaugh Maps; Combinational Logic; Functions of Combinational Logic; Flip-Flops and Related Devices; Counters; Shift Registers; Sequential Logic; Memory and Storage;.

Evaluation Methods: (only items in dark print apply):

1. Examinations / Quizzes
2. Homework
3. Report
4. Computer Programming
5. Project
6. Presentation
7. Course Participation
8. Peer Review

Course Learning Outcomes¹: By the end of this course students will be able to:

1. Explain basic digital concepts including digital vs. analog, bits, logic levels, logic operations, functions and digital waveforms [1]
2. Solve problems involving conversions between decimal, binary, octal and hexadecimal number systems, signed numbers, arithmetic operations, digital codes such as BCD, ASCII, parity and error detection/correction [1]
3. Understand the operation of basic logic gates (NOT, AND, OR, ex-OR, NAND, NOR) using truth tables, logic circuit elements, timing diagrams and implementation using fixed-function integrated circuits [3]
4. Formulate and solve problems using Boolean Algebra including laws, rules, DeMorgan's theorem and boolean analysis of logic circuits [1]
5. Construct simplified logic circuits using boolean algebra, standard forms of boolean expressions, boolean expressions from truth tables and Karnaugh maps for minimization [1]
6. Apply combinational logic analysis to digital systems including realization techniques, the universal property of NAND/NOR gates, implementation and testing with pulse waveform inputs [1]
7. Analyze the operation of combinational logic circuits including adders, comparators, decoders, encoders, code converters, multiplexers, demultiplexers, parity generators/checkers [1]
8. Design combinational logic circuits including look-ahead carry adders, comparators, priority encoders, I/O drivers, parity generators/checkers [3]

9. Demonstrate knowledge of sequential logic circuit elements like flip-flops, latches, timers and their applications [1]
10. Design counter circuits to meet specifications including specified number sequences [1]
11. Outline the types of shift register circuits including various I/O configurations, Ring and Johnson counters [1]
12. Demonstrate knowledge of memory and storage including operation, types and circuits [1]
13. Explain a contemporary issue in the field of computer engineering [3]
14. Use modern engineering tools including modeling and simulation software and virtual instruments [3]
15. Perform laboratory experiments utilizing digital system analysis, design and implementation techniques [3]
16. Prepare laboratory reports that clearly communicate experimental information in a logical and scientific manner [3]

¹Numbers in brackets refer to method(s) used to evaluate the course learning outcome.

Relationship to Program Outcomes (only items in dark print apply)²: This course supports the following Electrical Engineering Program Outcomes, which state that our students will:

1. have the ability to apply knowledge of the fundamentals of mathematics, science, and engineering; [1-4, 12]
2. have the ability to use modern engineering tools and techniques in the practice of electrical engineering; [14]
3. have the ability to analyze electrical circuits, devices, and systems; [6, 7, 9, 11]
4. have the ability to design electrical circuits, devices, and systems to meet application requirements; [8, 10]
5. have the ability to design and conduct experiments, and analyze and interpret experimental results; [5, 15]
6. have the ability to identify, formulate, and solve problems in the practice of electrical engineering using appropriate theoretical and experimental methods; [1-3]
7. have effective written, visual, and oral communication skills; [16]
8. possess an educational background to understand the global context in which engineering is practiced, including:
 - a. knowledge of contemporary issues related to science and engineering; [13]
 - b. the impact of engineering on society;
 - c. the role of ethics in the practice of engineering;
9. have the ability to contribute effectively as members of multi-disciplinary engineering teams;
10. have a recognition of the need for and ability to pursue continued learning throughout their professional careers.

²Numbers in brackets refer to course learning outcome(s) that address the Program Outcome.

Contribution to Meeting Professional Component: (in semester hours)

Mathematics and Basic Sciences:		hours
Engineering Sciences and Design:	3	hours
General Education Component:		hours

Grade Replacement:

If you are repeating this course for a grade replacement, you must file an intent to receive grade forgiveness with the registrar by the 12th day of class. Failure to file an intent to use grade forgiveness will result in both the original and repeated grade being used to calculate your overall grape point average. A student will receive grade forgiveness (grade replacement) for only three (undergraduate student) or two (graduate student) course repeats during his/her career at UT Tyler. (2006-08 Catalog, p. 35)

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Date:

5 January 2002
28 June 2002
8 January 2004
6 January 2005
9 January 2006
21 December 2006
13 January 2008
12 January 2009
20 August 2010
17 August 2012
29 July 2013
20 July 2015
21 August 2018