The University of Texas at Tyler

**Department of Electrical Engineering**

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| EENG 3302: Digital Systems (required) |

**Syllabus**

Catalog Description:

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| 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.  |

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| Prerequisites:  | MATH 2413 Calculus I |

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

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

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| 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> |

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| Course Coordinator:  | Melvin Robinson, Assistant Professor |

Topics Covered: (paragraph of topics separated by semicolons)

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| 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):

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| 1. Examinations / Quizzes
2. Homework
3. Report
4. Computer Programming
5. Project
6. Presentation
7. Course Participation
8. Peer Review
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Course Learning Outcomes1: By the end of this course students will be able to:

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| 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 cicuits 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]
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*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:

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| 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:
9. knowledge of contemporary issues related to science and engineering; [13]
10. the impact of engineering on society;
11. the role of ethics in the practice of engineering;
12. have the ability to contribute effectively as members of multi-disciplinary engineering teams;
13. have a recognition of the need for and ability to pursue continued learning throughout their professional careers.
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*2Numbers in brackets refer to course learning outcome(s) that address the Program Outcome.*

Contribution to Meeting Professional Component: (in semester hours)

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

Grade Replacement:

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| 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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| Prepared By:Edited By:  | Janet Barger, Assistant ProfessorDavid Beams, Associate ProfessorMukul Shirvaikar, Associate Professor Mukul Shirvaikar, Associate Professor Mukul Shirvaikar, Professor | Date: | 5 January 200228 June 20028 January 20046 January 20059 January 200621 December 200613 January 200812 January 200920 August 201017 August 201229 July 201320 July 201521 August 2018 |