Syllabus for ELD-3020

Digital Electronics

Course Description

This course is a study in applied digital logic using electronic digital circuits. Students will learn about digital electronic fundamentals, including number systems, logic gates, Boolean algebra, logic families circuit design, flip-flops, combinational and synchronous logic circuit design, logic minimization techniques (Karnaugh maps, Quine-McCluskey method), finite state machines, counters, shift registers, encoders and decoders, multiplexers and demultiplexers, data storage, data conversion, data processing, and control. Learning is augmented by hands-on work through virtual labs using the NI Multisim software.

Topics

- Introduction to digital logic
- Number systems
- Basic logic gates
- Boolean algebra
- Logic minimization techniques
- Combinational logic circuits
- Adders, counters, and finite state machines
- Counters, shift registers, encoders, and decoders
- Data storage, data conversion
- Data processing and control

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Course Objectives

After completing this course, you should be able to:

CO 1 Explain the basic concepts and simulated tools in digital electronics.

CO 2 Demonstrate conversions across different number systems and specialized codes.

CO 3 Discuss the operation, truth tables, and timing diagrams of basic logic gates.

CO 4 Apply Boolean algebra and other advanced techniques to simplify expressions.

CO 5 Describe combinational logic circuits and their common applications, like adders, comparators, encoders, and multiplexers.

CO 6 Discuss the sequential logic circuits, like latches, flip-flops, timers, shift registers, and counters.

CO 7 Describe the basic elements of data storage, data conversion, and computer systems.

Study Materials

You will need the following materials to complete your coursework. Some course materials may be free, open source, or available from other providers. You can access free or open-source materials by clicking the links provided below or in the module details documents. Please visit the following website to purchase course materials: University's textbook supplier.

Required Textbooks

- Floyd, T. L. (2015). *Digital fundamentals* (11th ed.). Pearson.

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ISBN-13: 978-0132737968

Additional Learning Resources

- NI Circuit Design Suite—Student Edition. Download Studica or Digilent.
- Student Resources for Floyd, Digital Fundamentals, 11/e

Course Structure

Digital Electronics is a 3-credit, online course consisting of 6 modules. Modules include an overview, topics, learning objectives, study materials, and activities. Module titles are listed below.

- **Module 1: Introduction, Number Systems and Codes**
  Course objectives covered in this module: CO 1, CO 2, CO 3
- **Module 2: Logic Gates**
  Course objectives covered in this module: CO 3
- **Module 3: Boolean Algebra and Logic Minimization**
  Course objectives covered in this module: CO 4
- **Module 4: Combinational Logic and Common Functions**
  Course objectives covered in this module: CO 5
- **Module 5: Latches, Flip-Flops, and Shift Registers**
  Course objectives covered in this module: CO 6
- **Module 6: Counters, Memory, Data Conversion, and Processing**
  Course objectives covered in this module: CO 6, CO 7

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Assessment Methods

You are required to participate in the following for formal work in the course:

- Write online discussion forum posts
- Complete written assignments
- Complete virtual labs
- Take a proctored midterm exam
- Finish a final project

See below for details.

Consult the Course Calendar for due dates.

Promoting Originality

One or more of your course activities may utilize a tool designed to promote original work and evaluate your submissions for plagiarism. More information about this tool is available in this Plagiarism Detection Tool Google document.

Discussion Forums

You are required to complete **6** discussion forums. The discussion forums are on a variety of topics based on the course modules. For each discussion forum, your initial post should be a minimum of 300 words and you should cite at least two sources. Your replies to your classmates should be substantive and add academic value.

Written Assignments

You are required to complete **6** written assignments. The written assignments are on a variety of topics associated with the course modules. For each written assignment, respond to the questions provided, showing full work. Partial credit for incorrect answers

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will not be provided unless work is available.

Virtual Labs

You are required to complete **6** virtual labs. The virtual labs are on a variety of topics associated with the course modules. All required work must be submitted as one document, including typed work, electronically generated work, and handwritten work (if necessary).

Midterm Examination

The online proctored midterm exam covers all material assigned in Modules 1 through 3 of the course. You will have 2 hours and 30 minutes (2.5 hours) to complete 36 multiple-choice items.

For a list of key concepts that may appear on your exam and exam details, refer to the exam study guide available in the Examinations section of the course.

You are required to use the University's Online Proctor Service (OPS). Please refer to the "Examinations and Proctors" section of the Online Student Handbook (see Student Handbooks in the General Information area of the course website) for further information about scheduling and taking online exams and for all exam policies and procedures.

You are strongly advised to schedule your exam within the first week of the semester.

Online exams are administered through the course website. Consult the Course Calendar for the official dates of exam weeks.

Statement About Cheating

You are on your honor not to cheat during the exam. Cheating means:

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- Looking up any answer or part of an answer in an unauthorized textbook or on the Internet, or using any other source to find the answer.

- Copying and pasting or in any way copying responses or parts of responses from any other source into your online test. This includes but is not limited to copying and pasting from other documents or spreadsheets, whether written by yourself or anyone else.

- Plagiarizing answers.

- Asking anyone else to assist you by whatever means available while you take the exam.

- Copying any part of the exam to share with other students.

- Telling your mentor that you need another attempt at the exam because your connection to the Internet was interrupted when that is not true.

The exam will be made invalid and you will fail the course if there is evidence that you have cheated or plagiarized in your exam.

Final Project

The final project consists of two parts. The first part contains six in-depth review questions. These questions require substantive answers, which may include tables and diagrams. The second part consists of six simulation problems covering design and testing of circuits and systems. It requires the use of Multisim software.

Grading and Evaluation

Your grade in the course will be determined as follows:

- **6 online discussions** are worth **18% of your final grade.**
- **6 written assignments** are worth **24% of your final grade.**

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- **6 virtual labs** are worth **18% of your final grade.**
- A proctored **midterm exam** is worth **20% of your final grade.**
- The **final project** is worth **20% of your final grade.**
    - **Part 1 of the project** is worth **8% of your final grade.**
    - **Part 2 of the project** is worth **12% of your final grade.**

All activities will receive a numerical grade of 0–100. You will receive a score of 0 for any work not submitted. Your final grade in the course will be a letter grade. Letter grade equivalents for numerical grades are as follows:

- **A** is **93 to 100**
- **A minus** is **90 to 92**
- **B plus** is **88 to 89**
- **B** is **83 to 87**
- **B minus** is **80 to 82**
- **C plus** is **78 to 79**
- **C** is **73 to 77**
- **C minus** is **70 to 72**
- **D** is **60 to 69**
- **F** is **any grade below a 60**

To receive credit for the course, you must earn a letter grade of C or better (for an area of study course) or D or better (for a course not in your area of study), based on the weighted average of all assigned course work (e.g., exams, assignments, discussion postings).

Strategies for Success

First Steps to Success

To succeed in this course, take the following first steps:

- Read carefully the entire syllabus, making sure that all aspects of the course are clear to you and that you have all the materials required for the course.

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- Take time to read the entire Student Handbook. The Handbook answers many questions about how to proceed through the course, how to schedule exams, and how to get the most from your educational experience at Thomas Edison State University.

- Arrange to take your examination by following the instructions in this syllabus and the Student Handbook.

- Familiarize yourself with the learning management systems environment—how to navigate it and what the various course areas contain. If you know what to expect as you navigate the course, you can better pace yourself and complete the work on time.

- If you are not familiar with web-based learning be sure to review the processes for posting responses online and submitting assignments before class begins.

Study Tips

Consider the following study tips for success:

- To stay on track throughout the course, begin each week by consulting the Course Calendar. The Course Calendar provides an overview of the course and indicates due dates for submitting assignments, posting discussions, and submitting the final project.

- Check Announcements regularly for new course information.

Using AI Ethically: A Guide for TESU Students

TESU's Academic Code of Conduct permits student AI use in support of their writing and research process—not as a replacement for original writing.

Document AI use with an acknowledgment statement at the end of each assignment, noting the tools and prompts used. Cite any AI-generated content on the References page.

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Please review Using AI Ethically: A Guide for TESU Students for more detailed information.

Commitment to Diversity, Equity, and Inclusion

Thomas Edison State University recognizes, values, and relies upon the diversity of our community. We strive to provide equitable, inclusive learning experiences that embrace our students' backgrounds, identities, experiences, abilities, and expertise.

Accessibility and Accomodations

Thomas Edison State University adheres to the Americans with Disabilities Act (ADA, 1990 and ADAAA, 2008) and Section 504 of the Rehabilitation Act of 1973.

The Office of Student Accessibility Services (OSAS) oversees requests for academic accommodations related to disabilities, including:

- A student who is pregnant, postpartum, or parenting a newborn who is not the birth parent [as covered under NJSA18A].
- Students requesting academic accommodation for a short-term or temporary illness.
- TESU students requesting academic accommodation for an injury.

Information can be found on the Office of Student Accessibility Services webpage.

Questions can be sent to ADA@tesu.edu.

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Academic Policies

Familiarize yourself with all administrative and academic policies, including those related to the following list, to ensure success in all your academic endeavors and coursework at Thomas Edison State University:

- Academic integrity
- Course late submissions
- Extensions for the course
- Grading policies

For more, see:

- University-wide policies
- Undergraduate academic policies
- Undergraduate course policies
- Graduate academic policies
- Graduate course policies
- Nursing student policies
- Nursing graduate student policies
- International student policies
- Academic code of conduct

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