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ENGR 350 Digital Logic and Design

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Xavier University

Department of Physics

Course Syllabus: ENGR 350 Digital Logic and Design - Fall 2016

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Text: Digital Design and Computer Architecture, Second Edition, D. Harris and S. Harris, Morgan Kaufman, ©2013

Software:

- **Logisim:** A digital logic design and simulation program. Logisim is an open source program written in Java, so it runs under all major operating systems.
- **OrCAD:** to implement the electronics of logic designs.

Grading Policy:

Homework: 15%

Lab Reports 20%

Midterm 25%

Final 30%

Project 10%

Course Description:

All modern computers and digital devices are based on some combination of basic digital logic and Boolean principles. Even the most complex digital systems operate on simple logic components (logic gates). Hence, the understanding of these gates and functions is essential to analyze and design digital circuits and systems. The goal of this course is to introduce the binary system, digital logic, logic gates, minimization techniques, and combinatorial logic. Students will also learn how to analyze and design combinatorial and sequential logic circuits such as adders; encoders, decoders, multiplexers, and counters. Laboratory work will include designing, building and testing of digital circuits, logic and sequential circuits.

Course Objectives: As a result of taking this course, students will have\be able to

- A. Understand digital logic principles and functions.
- B. Implement digital designs using discrete components.
- C. Use Cadence and Logisim software to design and test basic digital circuits.
- D. Design combinational circuits using logic gates and other common building blocks.
- E. Learn to work in teams in the laboratory, design projects and exam preparation.

ABET Student Outcomes	Course Learning Objectives	Level of Support
(a) an ability to apply knowledge of mathematics, science, and engineering	A,B,C,D,E	5
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	B,C,D,E	4
(c) an ability to design a system, component, or process to meet desired needs	B,E	3
(d) an ability to function on multi-disciplinary teams	E	3
(e) an ability to identify, formulate, and solve engineering problems	E	4
(f) an understanding of professional and ethical responsibility		0
(g) an ability to communicate effectively		0
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context		0
(i) a recognition of the need for, and an ability to engage in life-long learning		0
(j) a knowledge of contemporary issues		0
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	C,E	4

Tentative Topics

1. Introduction to Digital Systems
2. Binary Numbers and Codes
3. Basic Logic Gates
4. Logic Circuit Simplification\Boolean Algebra
5. Karnaugh Maps
6. Encoding and Decoding
7. Arithmetic Circuits
8. Flip Flops and Multi-vibrators
9. Counters and Shift Registers
10. Digital System Architecture

POLICIES:

CLASSROOM CONDUCTS: In order to create an appropriate environment for teaching and learning, students must show respect for their instructor and fellow students. Listed below are a few guidelines for classroom behavior. Students are expected to follow these rules to ensure that the learning environment is not compromised.

- **Class Participation:** You are expected to be in class the entire class time. Please do not enter late or leave early. Rare exceptions may be made, particularly in emergency situations. Your participation in the class is crucial for assessment and material flow.
- **Absence:** Inform the instructor in advance, if you know you are going to miss a class. Also, take responsibility for getting missed assignments from other students. Your instructor is not responsible for re-teaching the material you missed due to an absence or being late.
- **Internet browsing/texting:** Please turn off your cell phone/laptop and listen to lectures. Check your emails before coming to class.

PLAGIARISM: All forms of cheating and plagiarism are serious offenses that can result in disciplinary penalties including expulsion from the university. This includes copying assignments from the Internet! Refer to the student handbook for details.

ASSIGNMENTS

- You can discuss homework with each other, but can not write up together.
- You can use the Web/books/papers/library for finding a solution methodology, but do not search for a solution manual nor use an existing solution manual for your assignment.
- Any student who copies or permits another student to copy will receive a 0 for the assignment

EXAMS: Exams will consist of problems designed to test your understanding of the concepts covered in class. Anyone missing an exam will receive a zero grade for that exam. Make-up exams will only be given with a doctor's note stating that you were too ill on the day of the exam to attend, or documented extraordinary circumstances.