CSCI 1510 - Syllabus

Logic Design

Term: Fall 2021

Instructor

Javier Pastorino. **Website**

Email: *name**.**lastname **at** ucdenver.edu*

Office: LWC #822 - Machine Learning LAB

Office Hours: Thu 10-11am; appointments are required. *Schedule here*.

Catalog Description

The design and analysis of combinational and sequential logic circuits. Topics include binary and hexadecimal number systems; Boolean algebra and Boolean function minimization; and algorithmic state machines. Lecture/lab includes experiments with computer-aided design tools. This course requires the level of mathematical maturity of students ready for Calculus I. Max hours: 3 Credits

Textbook

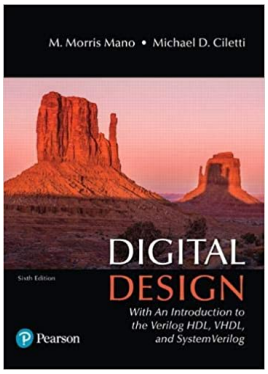
Digital Design: With an Introduction to the Verilog HDL.

6th Edition.

M. Morris Mano, Michael D. Ciletti.

Pearson.

ISBN: 978-0-13-454989-7. **Required**



Learning Objectives

Expected Knowledge at the Start of the Course

The student will need expertise in the following to be able to complete the course:

- Knowledge/completion of Algebra I course: number systems, numbering properties (distributive, commutative, etc.), and number types.
- Knowledge of computer programming techniques is strongly recommended, but not required.

Prerequisites & Co-Requisites

- **None**

Learning Outcomes

- Able to convert from/to binary and hexadecimal numbers.
- Ability to read/understand basic combinational and sequential logic diagrams.
- Familiarity with computer aided design (CAD) tools.
- Familiarity with the design and implementation of Algorithmic state machines.

ABET Assessment Criteria

CS5-4 The study of computing-based systems at varying levels of abstraction.

Course Objectives

1. The student will learn to add/subtract in binary, octal, and hexadecimal.
    a. The student will be able to add/subtract using R-1's (diminished radix) complement
    b. The student will be able to add/subtract using R's (radix) complement
2. The student will be able to convert between different bases.
3. The student will be able to convert a problem statement to Boolean Algebra.
4. The student will learn and be able to correctly use various logic gates (to include, but not limited to, AND, OR, NOR, XOR).
5. The student will gain a familiarity with CAD tools.
    a. The student will be able to create a design using a CAD tool.
    b. The student will be able to simulate a design using a CAD tool.
    c. The student will be able to determine if their design meets the problem specification.
6. The student will be able to perform algebraic manipulation of a Boolean expression.
7. The student will be able to simplify a Boolean expression using Karnaugh Maps.
8. The student will gain an understanding of and be able to design basic combinational and sequential logic diagrams (e.g. registers, counters, adders, flip-flops, etc.).
9. The student will be able to design and implement Algorithmic state machines.

Course Details

Topics

- Digital Systems and Binary numbers
- Boolean Algebra and Logic Gates
- Synchronous Sequential Logic
- Registers and Counters

- Gate-level Minimization
- Combinational Logic
- Algorithmic State Machines (state tables and state diagrams)

Course Delivery

Students are required to complete assigned readings before each lecture, in which we will cover the most important topics of those readings. Class attendance and participation is required and graded. Showing up late for class is disruptive and should be avoided. A student arriving within the first 15 minutes will be marked as tardy with a 50% credit on attendance after that the student will not receiving attendance credit and if a quiz was given, the student will not be allowed to make up the quiz.

Students are required to attend the section they are enrolled for.

We will have four laboratories in which we will apply the concepts to an actual design using LogiSim, a design application.

Assessments

The course will be assessed in two fronts. The first one will measure the understanding of the materials, and the second one the application of those concepts. Therefore, the course will have the following evaluations.

- **Attendance and Participation**. Class attendance and participation is **mandatory**. Part of your grade is based on your attendance and participation.
- **Quizzes**. Quizzes evaluate the understanding of the materials covered during lectures and prepare the student for tests. The lowest quiz grade will be **dropped** at the end of the semester.
- **Laboratories**. Labs will evaluate the application of theoretical concepts into practice using *LogiSim*.
- **Homework**. The student will have homework assigned to practice on paper exercises on the course topics.
- **Tests**. There will be three tests during this course during class time. Each will test the student's ability to apply the acquired knowledge to specific problems

*In general there will **no make up assessment**. However mitigating circumstances may be considered if and only if discussed with the instructor before the assessment.*

Course Policies

1. Students **MUST** show their work on all assignments. It is possible to get partial credit for problems. Part of this class is learning how to solve problems and the steps required to achieve that goal. **If you do not show your work, the problem will be graded as incorrect and will receive NO credit**.
2. Each student is responsible for the work they have submitted. Be sure that it is your own work. Violations of the Student Honor Code will not be tolerated. The Student Honor Code is attached below for your convenience and is available on Canvas. Ensure you have read, signed and dated the Honor code prior to turning it in.
3. Please see the Academic Calendar (available on Canvas) for important dates for this Semester. If you are taking classes not in the College of Engineering, those courses may have a different final drop date.
4. **As a general rule, extra credit is not an option in this class.**
5. **Check Canvas often.** Up-to-date course information, homework/lab assignments, grades, announcements will be updated frequently.
6. During class and lab, it is expected that you will be working on material related to this course. If you choose to work on material for other courses, you may be asked to desist and/or leave the lab. If you choose to leave, you will not get attendance credit for the day.
7. Lab time should be dedicated to completing the labs with the instructor available to assist you. It is in your best interest to pay attention to the material presented in class and during lab periods.
8. **The syllabus is subject to change. This is Colorado and Mother Nature sometimes wins. :-)**

Schedule

The following is a tentative schedule for the semester.

CSCI 1510 - Fall 2021

Week	Date	Topic	Assignment (criteria)	Assigned Readings
#1	Tue, Aug 24	**Introduction/Math Assess. (Not Graded)**		
	Thu, Aug 26	**Chapter 1**	Hw 1.a	1.1, 1.2, 1.3
#2	Tue, Aug 31	**Chapter 1**		1.4,1.5,1.6
	Thu, Sep 02	**Chapter 1**	Hw 1.b. **Lab 0 & Lab 1**	1.7, 1.9
#3	Tue, Sep 07	**Lab 1**		
	Thu, Sep 09	**Lab 1**		
#4	Tue, Sep 14	**Chapter 1 Review and Quiz 1**		
	Thu, Sep 16	**Chapter 2**	Hw 2	2.1, 2.2, 2.3
#5	Tue, Sep 21	**Chapter 2**		2.4, 2.5, 2.6
	Thu, Sep 23	**Chapter 2**	Lab 2	2.7, 2.8
#6	Tue, Sep 28	**Lab 2**		
	Thu, Sep 30	**Lab 2**		
#7	Tue, Oct 05	**Chapter 2 Review and Quiz 2**		
	Thu, Oct 07	**Chapter 3**		3.1, 3.2, 3.3
#8	Tue, Oct 12	**Test 1 (Chp. 1 & 2)**		
	Thu, Oct 14	**Chapter 3**	Hw 3	3.4, 3.5, 3.6
#9	Tue, Oct 19	**Chapter 3**		3.7, 3.8
	Thu, Oct 21	**Chapter 3 / Lab 3**	Lab 3	
#10	Tue, Oct 26	**Lab 3**		
	Thu, Oct 28	**Chapter 3 Review and Quiz 3**		
#11	Tue, Nov 02	**Chapter 4**	Hw 4	4.1, 4.2, 4.3, 4.4
	Thu, Nov 04	**Test 2 (Chp. 3)**		
#12	Tue, Nov 09	**Chapter 4**		4.5, 4.6, 4.7, 4.8
	Thu, Nov 11	**Chapter 4 / Lab 4**	Lab 4	4.9, 4.10, 4.11
#13	Tue, Nov 16	**Lab 4**		
	Thu, Nov 18	**Chapter 5**	Hw 5	5.1, 5.2, 5.3, 5.4
#14	Tue, Nov 23 Thu, Nov 25	**Fall Break - No classes**		
#15	Tue, Nov 30	**Chapter 5 / Chapter 6**		5.5, 5.7, 5.8, 6.1, 6.2
	Thu, Dec 02	**Chapter 6**		6.3, 6.4, 6.5
#16	Tue, Dec 07	**Review Chapter 4, 5, and 6**		
	Thu, Dec 09	**Test 3**		
Finals	Tue, Dec 14 Thu, Dec 16	*Reserved*		

Notes:	**1.7**: Ascii Character Code & Error-Detecting Code **6.3**: Binary Ripple Counter Only

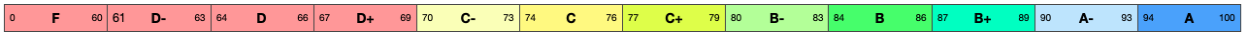
Grading Policies

The course final grade will be distributed between the different assessments as described above. The following table summarizes that.

- **Attendance and Participation**: 10%
- **Homework**: 25%
- **Laboratories**: 25%
- **Quizzes**: 10%
- **Tests**: 30%

Grade Dissemination: grades will be posted and announced on Canvas.

Letter Grade: the final grade (marks) will be translated (automatically by Canvas) to a corresponding letter grade using the following scale:



Grade Review: you are welcome to meet with your instructor/T.A. **within a week after the grades are posted to review corrections and markings**. **Save all your graded work (homework, quizzes, labs and tests) until the end of the semester.** In the event there is a mistake in grading or you desire contest your grade, you will need to work to verify your claim. Otherwise you grade will stand as computed.

Communications & Announcements

All communications will be conducted through Canvas. **Make sure you have your Canvas settings properly in place not to miss notifications**. You can set email notifications or use the Canvas app in your mobile device with push notifications.

If you need to contact me, you can email me through Canvas or directly to my university email. Please note that I usually reply within 48 hours. However, to discuss exercises, please schedule an appointment during my office hours using the given link above, I will usually not be able to answer those questions over email.

Code of Conduct

I encourage you to review material and discuss ideas with other students while reviewing the material and I strongly recommend you to set a study group to go over practice exercises and problems from the textbook.

However, **make sure you create your own work** when taking assessments (like quizzes, homework, labs, exams, etc.) and follow the guidelines depicted in each one. It's important that you go through the analysis and implementation of your own solution to develop the required skills and achieve the best understanding of the topic. For team assessments, "working together" does not mean that one student does the majority of the work while others just put their names on it! If you have any questions about what this means, please meet with me.

We reserve the rights to use automated similarity metrics in order to detect plagiarism in this course as **all students must create their own work!**

Any instances of cheating will result in a zero for the assignment, a grade of zero (an "F") in the course, or sanctions determined by the college (including probation, suspension and expulsion).

All students must follow the College of Engineering, Design and Computing - Student Honor Code.

Last Updated on: August 10th, 2021.-