# CSCI-1510: Logic Design
# Course Syllabus
# Fall 2017

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**Office:** Lawrence Street Center, Rm 834

**Office Hours**: MW 12:45 – 1:45 PM
TTH 9:45 -10:45 AM
T only 1:00 – 2:00 PM

**Classroom:** Lawrence Street Center, Rm 840 (PC Lab)

**Catalog Data**: 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

**Co-requisite:** NONE
**Pre-requisite:** NONE

**Expected Knowledge at the Start of 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.

**Expected Knowledge at Course Completion:**

- 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:**

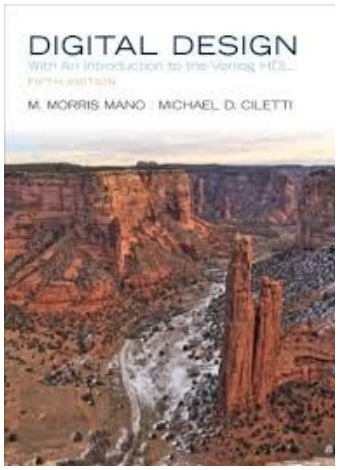
(a) An ability to apply knowledge of computing and mathematics appropriate to the discipline.

**Course Objectives:**

1. The student will learn to add/subtract in binary, octal, and hexadecimal.
   1.1 The student will be able to add/subtract using R-1's complement
   1.2 The student will be able to add/subtract using R's complement
2. The student will be able to convert given numbers 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, specifically OrCad®.
   5.1 The student will be able to create a design in OrCad®.
   5.2 The student will be able to simulate a design in OrCad®.
   5.3 The student will be able to determine if their design meets the problem statement.
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.
9. The student will be able to design and implement Algorithmic state machines.

**Textbook:**

Digital Design: With an Introduction to the Verilog HDL,
M. Morris Mano, Michael D. Ciletti, ISBN: 9780132774208




**Topics:**

1. Digital Systems and Binary numbers
2. Boolean Algebra and Logic Gates
3. Gate-level Minimization
4. Combinational Logic
5. Synchronous Sequential Logic
6. Registers and Counters
7. Algorithmic State Machines (state tables and state diagrams)

**Course Outline:**

| Week | Day | Date | Topic | Reading | Assignment (ABET Criteria if applicable) |
|---|---|---|---|---|---|
| 1 | M | 8/21 | Introduction/Chapter 1 | Ch 1 | |
| | W | 8/23 | Chapter 1 | Ch 1 | |
| 2 | M | 8/28 | Chapter 1/Lab 1 | Ch 1 | |
| | W | 8/30 | Lab 1 | | |
| 3 | M | 9/4 | Labor Day | | |
| | W | 9/6 | Chapter 2 | Ch 2 | Hwk 1 Due (a) |
| 4 | M | 9/11 | Chapter 2 | Ch 2 | Lab 1 Due |
| | W | 9/13 | Chapter 2 | | |
| 5 | M | 9/18 | Lab 2 | | Hwk 2 Due (a) |
| | W | 9/20 | Lab 2 | | |
| 6 | M | 9/25 | Review | | Lab 2 Due (b) |
| | W | 9/27 | Chapter 3 | Ch 3 | |
| 7 | M | 10/2 | **Test 1 – Chapters 1 & 2** | | |
| | W | 10/4 | Chapter 3 | Ch 3 | |
| 8 | M | 10/9 | Chapter 3 | | |
| | W | 10/11 | Lab 3 | | Hwk 3 Due (a) |
| 9 | M | 10/16 | Lab 3 | | |
| | W | 10/18 | Review | | |
| 10 | M | 10/23 | **Test 2 – Up to and including Chapter 3** | | |
| | W | 10/25 | Chapter 4 | Ch 4 | Lab 3 Due (b) |
| 11 | M | 10/30 | Chapter 4/Lab 4 | Ch 4 | |
| | W | 11/1 | Lab 4 | Ch 4 | Hwk 4 Due (a, b) |
| 12 | M | 11/6 | Chapter 5 | | |
| | W | 11/8 | Chapter 5 | Ch 5 | Lab 4 Due (a, b) |
| 13 | M | 11/13 | Lab 5 | Ch 5 | Hwk 5 Due (a, b) |
| | W | 11/15 | Chapter 6 | | |
| 14 | MW | | **FALL BREAK** | | |
| 15 | M | 11/27 | Lab 6 | Ch 6 | Lab 5 Due (a, b) |
| | W | 11/29 | Review | | Hwk 6 Due (a, b) |
| 16 | M | 12/4 | Lab 6 | | |
| | W | 12/6 | **Test 3 – Cummulative** | | Lab 6 Due (a, b) |
| 17 | MW | | **Finals WeeK** | | |

Reading Assignments:

| | | |
|---|---|---|
| 1.1 | 4.1 | |
| 1.2 | 4.2 | |
| 1.3 | 4.3 | |
| 1.4 | 4.4 | |
| 1.5 | 4.5 | |
| 1.6 | 4.7 | |
| 1.7 | 4.8 | |
| 1.8 | 4.9 | |
| 1.9 | 4.1 | |
| | 4.11 | |
| 2.1 | | |
| 2.2 | 5.1 | |
| 2.3 | 5.2 | |
| 2.4 | 5.3 | |
| 2.5 | 5.4 | |
| 2.6 | 5.5 | |
| 2.7 | 5.7 | |
| 2.8 | 5.8 | |
| | | |
| 3.1 | 6.1 | |
| 3.2 | 6.2 | |
| 3.3 | 6.3 | Binary ripple counter only |
| 3.4 | 6.4 | |
| 3.5 | 6.5 | |
| 3.6 | | |
| 3.7 | | |
| 3.9 | | |

As a general rule, if the topic is HDL we won't be discussing it.

**Grading Policy:**

Your grade will be composed of the following items:

| | | | |
|---|---|---|---|
| Attendance/Participation/Quizzes | 10% | Labs | 20% |
| Homework | 30% | Tests 1 - 3 | 40% |

Your letter grade for the course will be computed as follows:

[90-100] = A
[80-90) = B
[70-80) = C ***** I reserve the right to give + and – modifiers to the letter grades.**
[60-70) = D
[0-60) = F

**Please save all your graded work (homework, quizzes, labs, and exams) until the end of the semester.** In the event there is a mistake in grading or you contest your grade, you will need your work to verify your claim. Otherwise, your grade will stand as computed.

If you are not present on the day assignments are returned, it is **YOUR** responsibility to come to office hours and pick-up the assignment in question.

**Notes:**

1. Attendance is mandatory. Part of your grade is based on your attendance and participation.

   a) There are NO make-up exams. You must take the exam on the assigned day. If absolutely necessary AND coordinated in advance, you may take the exam early.
   b) There are NO make-up quizzes. The lowest quiz grade will be **dropped** at the end of the semester.
   c) You are required to attend the class you have registered for. You CANNOT make up a class by coming to another section.

2. You **MUST** show your 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.**

3. Assignments will be posted on Canvas. All assignments must be turned in by the beginning of class on the due date. Assignments is due on the due date, as posted on Canvas. If you cannot turn it in on the due date, you can always turn it in early with advance notice. **Late assignments will NOT be accepted**. The lowest homework grade will be **dropped**. No lab grades will be dropped.

4. You are responsible for the work you have submitted. Be sure that it is your own work. Violations of the Student Honor Code **will not be tolerated**. It 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.

5. 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.

6. As a general rule, extra credit is not an option in this class.

7. **Check Canvas often.** Up-to-date course information, homework/lab assignments, grades, announcements will be updated frequently.

8. During class and lab, it is expected that you will be working on material related to this course. If you choose to work on other course work, 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.

9. 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.

10. **The syllabus is subject to change. This is Colorado and Mother Nature sometimes wins.**

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# Student Honor Code

The Honor Code outlined below is the College of Engineering and Applied Science statement on academic integrity. The Code articulates the College's expectations of its students and faculty in establishing and maintaining the highest standards in academic work.

**Honor Code Text**

The Honor Code of the College of Engineering and Applied Science is a statement of its students, individually and collectively:

- Students will not give or receive aid during examinations.
- Students will not use any prohibited electronic devices during examinations.
- Students will not give or receive unpermitted aid in class work, in the preparation of reports, or in any other work that is to be used by the instructor as the basis of grading.
- Students will uphold the spirit and letter of the Honor Code and they will take an active role to ensure that others uphold the Honor Code and if they observe violations of the Honor Code they must report violations to their Department Chair.
- The Faculty of the College will do its part to ensure its confidence in the honor of its students. Faculty must ensure that precautions are in place to prevent the forms of dishonesty mentioned above. Faculty will also avoid, as far as practical, academic procedures that create temptations to violate the Honor Code. Faculty alone has the right and obligation to set academic requirements. However, the students and faculty will work together to establish optimal conditions for honorable academic work.

**Violations of the Honor Code**

Examples of conduct that will be regarded as being in violation of the Honor Code include:

- Copying from another's examination paper or allowing another to copy from one's own paper.
- Plagiarism in any shape or form. Plagiarism is defined as the use, without giving reasonable and appropriate credit to or acknowledging the author or source, of another person's original work, whether such work is made up of code, formulas, ideas, language, research, strategies, writing or other form(s).
- Giving or receiving unpermitted aid either in person or via electronic devices.
- Engaging in unauthorized collaboration on academic assignments or examinations.
- Representing as one's own work the work of another.

**Penalties for Violating the Honor Code**

Most student disciplinary cases have involved Honor Code violations. Of these, most cases arise when a student submits another's work as his or her own, gives or receives unpermitted aid, or engages in unauthorized collaboration. If a violation occurs during a quiz or on a homework assignment, the student will receive a zero for that quiz or assignment. If a violation occurs on an examination, the student will receive a failing grade for the course. The standard penalty for a first offense may include suspension from the College of Engineering and Applied Science for a severe infraction of the Honor Code. The penalty for a second violation will be expulsion from the College of Engineering and Applied Science.

It is the responsibility of the student to seek clarification from the instructor when in doubt about these guidelines.