CSE 241 Digital Systems

Summer 2018

Course Description

A course in digital principles which includes the following topics: fundamentals of digital logic, number systems, codes, computer arithmetic, Boolean algebra, minimization techniques, basic components of digital circuits such as logic gates and flip-flops, design of combinational and sequential circuits, memory devices, and programming logic. Recommended for sophomore-level students.

Learning Outcomes

- Understand and apply Boolean Algebra
- Understand logic gates and their operation
- Understand Karnaugh maps and apply them to simplify logic expressions
- Understand signed and unsigned integer representation and arithmetic
- MSI circuit decoders, multiplexers and design of combinational circuits
- Flip-flops and sequential circuit synthesis
- Verilog hardware description language, synthesis and simulation

Course Prerequisites

None

Required Materials:

You will buy a lab-kit of components customized for the course. You can buy at Jameco using one collective part number: 2244818, It costs $22.49 + shipping and handling. If you chose to order your parts from other vendors, you will be expected to have the required parts as listed below.
Optional Materials:

The second part that we will use in the lab is an Arduino Uno. This is a very versatile and highly useful microcontroller board. This is often used in prototyping small circuits, we will use it for power. There will one available for you to use for testing in the lab. Once again you can get this separately from any source convenient for you. This is available at amazon.com. It is the cheapest on amazon.com. You can buy both I. and II. (Arduino) together at Jameco using one collective part number: 2244800, It costs $44.65 + shipping and handling.


You and choose to get any edition of this book you would like. There are many digital logic books in publication, any of them will work.
Attendance

Lectures:
While attendance is not required, in class activities and quizzes may not be announced ahead of time. Lectures are not recorded.

Recitations/Labs:
If you complete your lab earlier than the full time assigned, attendance in the recitation is not required. If you must miss your section, speak with your instructor as soon as possible. You are to use this time to work on your lab assignments however you may need to spend additional time outside of the recitation to complete the work. If you complete your task early, you may also use this time to work on other course related assignments.

Recitation: MW 5:15-6:15 pm, Bonner 114
Lecture: MW 2-5:15 pm, NSC 205

Instructor Contact Information

Dr. Jennifer Winikus
Email: jwinikus@buffalo.edu
Website: www.cse.buffalo.edu/~jwinikus
Office Phone: 716-645-4757
Office: Davis 351

Office Hours

To be announced and by appointment.

Academic Content

This is a tentative list of topics:

- Number Systems
- Signed Arithmetic
- Boolean Arithmetic
- Karnaugh Maps
- Combinational Logic
- Logic Gates
- Sequential Logic
- Verilog Design
Program Outcome Support:

Program Outcome Support

0: Not Supported, 1: Minimally Supported, 2: Supported, 3: Strongly Supported

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<th>CEN Program Outcome</th>
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<th>d</th>
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Grading Policies

Your grade will be comprised of:
20 % Exam 1
30 % Exam 2
15 % Homework, Quizzes, and other assignments
35 % Laboratory Assignments
2% extra credit will be available by completing one the extra credit options provided

- Less than 60% performance on the lab portion of the course will result in an F in the course, independent of overall grade

Your final score for the course will be converted into a letter grade as follows:

- A: 100–94
- A-: 93–90
- B+: 89–87
- B: 86–84
- B-: 83–80
- C+: 79–77
- C: 76–74
- C-: 73–70
- D: 69–70
- F: 59–0

The instructor reserves the right to curve grades if appropriate and as they choose. The instructor reserves the right to award the D+ grade for grades in the range of 67-69 based on a situational basis.
Incompletes (I/IU): The course follows the university undergraduate incomplete policy. A grade of incomplete ("I") indicates that additional coursework is required to fulfill the requirements of a given course. Students may only be given an “I” grade if they have a passing average in coursework that has been completed and have well-defined parameters to complete the course requirements that could result in a grade better than the default grade. An “I” grade may not be assigned to a student who did not attend the course.

Prior to the end of the semester, students must initiate the request for an “I” grade and receive the instructor’s approval. Assignment of an “I” grade is at the discretion of the instructor.

The instructor must specify a default letter grade at the time the “I” grade is submitted. A default grade is the letter grade the student will receive if no additional coursework is completed and/or a grade change form is not filed by the instructor. “I” grades must be completed within 12 months – see the Incomplete Grade Policy for the schedule. Individual instructors may set shorter time limits for removing an incomplete than the 12-month time limit. Upon assigning an “I” grade, the instructor shall provide the student specification, in writing or by electronic mail, of the requirements to be fulfilled, and shall file a copy with the appropriate departmental office. Students must not re-register for courses for which they have received an “I” grade.

Collaboration Policies

Unless explicitly told, all work is to be done independently with only the assistance of TAs and the instructor. You may discuss the general concepts of assignments and what the question asks for with other students but you must not discuss answers.

Unauthorized collaboration will result in an “F” in the course as a violation of academic integrity.

Exam Policy

There will be 2 exams. The exams will be in class. You cannot borrow pens or pencils during the exam from other students. During the exam there is to be no talking or looking at your phone, doing so may result in an automatic “F” on the exam based on the incident.

Any accommodations must be made in advance barring extraordinary circumstances.

The exam structure includes a practice exam activity, the exam itself, and for the first exam, the correction session. The practice exam is a group assignment, included in the grade under the assignment category. The exam is the traditional closed resource and independent exam. The correction session is an optional session for the first exam that will allow you to redo problems you got wrong with the opportunity to get up to half the points lost back. The correction session allows paper resources.
Due Dates

All submissions will be made on UBLearns. All assignments have a time and a day due date. You may submit up to 24 hours late at no penalty. Corrections are not allowed on homework and lab assignments.

Late work:
No work will be accepted after midnight on the last day of classes barring extraordinary circumstances.

Regrade requests:
If you feel there is an error in your grade and want to have the grading reviewed, you can request a regrade.

Email Policy

Students are responsible for email sent to their official University at Buffalo email address. Communication will not be done with non-university email addresses. A level of professionalism is expected with all communications.

Accessibility Resources

If you have any disability which requires reasonable accommodations to enable you to participate in this course, please contact the Office of Accessibility Resources, 60 Capen Hall, 716-645-2608, and also the instructor of this course. The office will provide you with information and review appropriate arrangements for reasonable accommodations.

University Policies

Academic Integrity Policy:
https://catalog.buffalo.edu/policies/integrity.html

University Policy on Accommodations:
https://www.buffalo.edu/administrative-services/policy1/ub-policy-lib/reasonable-accommodation.html
The Office of Equity, Diversity and Inclusion provides many resources including the following policies to be followed:

Discrimination and Harassment:
http://www.buffalo.edu/administrative-services/policy1/ub-policy-lib/discrimination-harassment.html

Religious Accommodation and Expression:
http://www.buffalo.edu/administrative-services/policy1/ub-policy-lib/religious-accommodation-expression.html

Departmental Academic Integrity Policy
https://engineering.buffalo.edu/computer-science-engineering/undergraduate/resources-for-current-students/academic-integrity-students.html

**Departmental Statement on Academic Integrity in Coding Assignments and Projects**

All academic work must be your own. Plagiarism, defined as copying or receiving materials from a source or sources and submitting this material as one's own without acknowledging the particular debts to the source (quotations, paraphrases, basic ideas), or otherwise representing the work of another as one's own, is never allowed. Collaboration, usually evidenced by unjustifiable similarity, is never permitted in individual assignments. Any submitted academic work may be subject to screening by software programs designed to detect evidence of plagiarism or collaboration.

It is your responsibility to maintain the security of your computer accounts and your written work. Do not share passwords with anyone, nor write your password down where it may be seen by others. Do not change permissions to allow others to read your course directories and files. Do not walk away from a workstation without logging out. These are your responsibilities. In groups that collaborate inappropriately, it may be impossible to determine who has offered work to others in the group, who has received work, and who may have inadvertently made their work available to the others by failure to maintain adequate personal security. In such cases, all will be held equally liable.

**Departmental Policy on Violations of Academic Integrity**

The CSE Department has a zero-tolerance policy for AI violation. All AI violation cases will be reported to the department, school and university, and recorded. Even the 1st offense will receive "F" for the course, unless the instructor deems it appropriate to reduce the penalty.
Subsequent violation of AI in any form and in any other course will automatically result in a "F" grade, with no exception.

**Tentative Schedule**

The schedule and content is subject to change.

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<tr>
<th>Week</th>
<th>Date</th>
<th>Material</th>
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<tr>
<td>1</td>
<td>M 5/28</td>
<td>No Class Memorial Day</td>
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<tr>
<td>1</td>
<td>W 5/30</td>
<td>Introduction and intro to number systems, Signed and Boolean Arithmetic and Floating Point Basics</td>
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<tr>
<td>2</td>
<td>M 6/4</td>
<td>Simplification of Boolean Equations and Logic Gates</td>
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<tr>
<td>2</td>
<td>W 6/6</td>
<td>K-Maps and Combinational Logic</td>
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<td>M 6/11</td>
<td>Exam Prep</td>
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<td>3</td>
<td>W 6/13</td>
<td>Exam</td>
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<td>3</td>
<td>F 6/15</td>
<td>Optional: Exam Corrections, Davis 338A, 2-4pm</td>
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<tr>
<td>4</td>
<td>M 6/18</td>
<td>Combinational Logic, Decoders, Muxes, and Verilog</td>
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<td>4</td>
<td>W 6/20</td>
<td>Sequential Logic</td>
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<td>5</td>
<td>M 6/25</td>
<td>More Sequential Logic and Verilog</td>
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<td>5</td>
<td>W 6/27</td>
<td>Logic in application, Exam Prep</td>
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<td>6</td>
<td>M 7/2</td>
<td>Final Exam</td>
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<tr>
<td>6</td>
<td>W 7/4</td>
<td>4th of July</td>
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Final exam is scheduled- In class July 2

**Important Dates**

First Day of Classes: May 29
Last Day to Drop/Add: May 31
Last Day to Resign: June 25
Last Day of Classes: July 6