CSE241
Registration #10013
Digital Systems
Summer 2020

Course Information

Live Optional Q&A/Demos

minimum 2 hours per week

- See calendar for dates and times

4 credit hours
(3 credits for lecture + 1 credit for lab)

Instructor Information

Dr. Jennifer Winikus

- *Email:* jwinikus@buffalo.edu
- *Webpage:* https://www.cse.buffalo.edu/~jwinikus
- *Office:* 351 Davis Hall
- *Office hours:*
  - By Appointment
    https://calendly.com/jwinikus/20min

Please do not hesitate to participate in a live stream session or make an appointment for assistance. You should never hesitate to ask questions, whether it be a simple/fundamental question, something more advanced that you are interested in, or simply to chat about the material/department/life in general. Remember that you are always welcome with any level of question and should not be shy to ask.

Note: If you need to email course staff, please include **[CSE 241]** at the beginning of the subject line so your email is not missed. **Email without this subject or from non-UB accounts will be ignored.**

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.

Course Prerequisites

None, however familiarity with using a computer is necessary. If you do not feel comfortable with word processors, web browsers, or general computing this course may not be appropriate at this time for you and you should speak with the instructor immediately.

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

Program Outcome Support:

Program Outcome Support
0: Not Supported, 1: Introduced, 2: Reinforced, 3: Mastered

CEN Program Outcome	1	2	3	4	5	6	7
Support Level	2	0	0	0	0	0	1

Mappings:

Course Learning Outcome	**EAC 1**	**EAC 7**	**Assessment Type**
Understand and apply Boolean Algebra	x	x	Homework, Labs,Quizzes, Activities, and Exams
Understand logic gates and their operation	x		Homework, Labs,Quizzes, Activities, and Exams
Understand Karnaugh maps and apply them to simplify logic expressions	x	x	Homework, Labs,Quizzes, Activities, and Exams
Understand signed and unsigned integer representation and arithmetic	x		Homework, Labs,Quizzes, Activities, and Exams

MSI circuit decoders, multiplexers and design of combinational circuits	x	x	Homework, Labs,Quizzes, Activities, and Exams
Flip-flops and sequential circuit synthesis	x	x	Homework, Labs,Quizzes, Activities, and Exams
Verilog hardware description language, synthesis and simulation	x	x	Homework, Labs,Quizzes, Activities, and Exams

UB Portfolio

If you are completing this course as part of your UB Curriculum requirements, please select an 'artifact' from this course that is representative of your learning and upload it to your UBPortfolio (powered by Digication) account. Templates have been created for this purpose. Artifacts include homework assignments, exams, research papers, projects, lab reports, presentations, and other course materials. Your final UB Curriculum requirement, UBC 399: UB Curriculum Capstone, will require you to submit these 'artifacts' as you process and reflect on your achievement and growth through the UB Curriculum. For more information, see the UB Curriculum Capstone website: https://www.buffalo.edu/ubcurriculum/capstone.html.

Tentative Plan for Assignments:

To support the learning objectives and online delivery, the course will be delivered in modular units. Each unit will include a lab, homework, and a concluding quiz. Each unit must be completed before moving on to the next unit. Multiple units may be assigned at a time for flexibility, however there will be hard cut offs for completion of units that work for them will not be accepted after that date. You will still need to complete the units due to the inherent cumulative nature of the course.

Modules will be released at minimum the day of the recommended start time. Some modules may be released earlier.

Content recordings: Content will be provided via Panopto and you are expected to watch it as part of your grade. Panopto will track your progress in viewing the materials through embedded quizzes. These are available to be watched at your convenience, however they must be watched before the cut off time to count towards your grade.

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

Unit and Assignment Breakdown:

- Intro (Unit 1)
    - Quiz
- Numeric Systems and Codes (Unit 2)
    - Content Recordings
    - Homework
    - Quiz
- Boolean/Switching Algebra (Unit 3)
    - Content Recordings
    - Homework
    - Quiz

EXAM 1 - Cut off for units 1-3 to count towards grade

- Implementation Technology (Unit 4)
    - Content Recordings
    - Homework
    - Lab
    - Quiz
- Combinational Logic Systems (Unit 5)
    - Content Recordings
    - Homework
    - Lab
    - Quiz
- Minimization and optimization of Combinational Logic (Unit 6)
    - Content Recordings
    - Homework
    - Lab
    - Quiz

- Structural and Dataflow Verilog (Unit 7)
    - Content Recordings
    - Homework
    - Quiz
- MSI Devices (Unit 8)
    - Content Recordings
    - Homework
    - Lab
    - Quiz

EXAM 2 - Cut off for units 4-8 to count towards grade

- Sequential Logic Building Blocks and Devices (Unit 9)
    - Content Recordings
    - Homework
    - Lab
    - Quiz
- Behavioral Verilog (Unit 10)
    - Content Recordings
    - Homework
    - Quiz
- Synchronous Sequential Logic Systems (Unit 11)
    - Content Recordings
    - Homework
    - Lab
    - Quiz
- Finite State Machine Design (Unit 12)
    - Content Recordings
    - Project
    - Quiz

EXAM 3 - Cut off for units 9-12 to count towards grade

- excluding project which is due at end of the term

- Coding Theory Intro (Unit 13)
    - Content Recordings
    - Quiz
- Fabrication (Unit 14)
    - Content Recordings
    - Quiz

Cut off for units 13 and 14 last day of classes

GRADING POLICIES

Your grade will be comprised of:

4% Content Recordings
10% Homework (10)
14% Unit Quizzes (14)
30% Laboratory Assignments* (6)
15% Project**
7% Exam 1
10% Exam 2
10% Exam 3

Extra credit opportunities may be offered.

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+: 69–67
- D: 66-60
- F: 59–0

It is possible that these ranges may be adjusted at the **end** of the semester to address inconsistencies or hardships that arise. Grades will not be curved/adjusted during the semester. Pleas of grade modifications will not be accepted.

*If you score less than **60**% for the lab score for the term, you will **fail** the course independent of overall grade.

If you score less than **50% for the project score for the term, you will **fail** the course independent of overall grade.

Students will receive **a grade of "F" if they are found in violation of the academic integrity policy**. Please make sure to thoroughly read and understand the policy for this course.

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. 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

Failure for Non-Attendance (FX): Students who have earned a failing grade due to lack of attendance (or participation where attendance is no applicable) will be awarded an "FX".

TEXTBOOK AND MATERIALS

Required: None

Recommended References:

- "Digital Design: Principles and Practice" 5th Edition, by John F. Wakerly. Pearson, 2017. ISBN-13: 978-0134460093, ISBN-10: 013446009X
- "Digital Design With An Introduction to the Verilog HDL, VHDL, and System Verilog" 6th Edition, by M.Morris Mano and Michael D. Ciletti
- "Fundamentals of Digital Logic with Verilog Design", 1st Edition, by Stephen Brown and Zvonko Vranesic

TECHNOLOGY REQUIREMENT

Students will need access to a computer, digital camera (to take images of hand done work for submission), and internet. If this is not possible, please contact the instructor immediately.

Optional Attendance

Live Q&A/Demo Sessions: These scheduled for 2 or 3 start times depending on the week. Content will be recorded and posted. The duration will vary based on participation and commitments.

Office hours: Optional video conferencing sessions for additional assistance. The general availability set for meeting times are:

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
10am-7pm	7am-10pm 1pm-7pm	9am-8pm	9am-8pm	11am-10pm	9am-5pm	10am-5pm

Calendly will automatically adjust options for appointments based on commitments in my schedule. If available times don't work or none are left, please email to see if other times can be arranged. You do not need permission to sign up, if you need any assistance (or even just someone to talk to), sign up. Please restrict to no more than 2 appointments a day, if you need assistance beyond that please email.

To sign up: https://calendly.com/jwinikus/20min

Decorum

Email:

- It is understood that there is a large amount of email correspondence expected, please be patient with responses.
    - To expedite response times, please make sure to include **CSE241** in the content of your subject line.
- All emails should be detailed enough to provide context in which course staff can support you. Emails which are not clear only serve to delay the information you need.

Q&A/Demo Sessions:

- Please mute your microphone if there is noise in your environment to be courteous to your peers.
- If your camera is turned on, please adhere to appropriate behavior and appearance
- Disruptive behaviors, including excessive talking, arriving late to class, sleeping, reading newspapers, using unauthorized electronic devices during class is not permitted.

    - Repetitive and/or seriously disruptive behavior will result in removal from the collaboration suit and further consequences may be applied through Student Conduct Regulations handled by the Office of Student Conduct and Advocacy. Substantial issues will be handled through the University Police Department.

In general:

- Online delivery can lead to potential for non-traditional working hours. To foster a work-life balance for you and the course staff, working hours are defined as Monday-Friday 9am to 5pm plus other times designated explicitly as open office hours or appointments.
    - Outside of those working hours, response times may be delayed.
- Meaningful and constructive dialogue is encouraged in this class and requires a degree of mutual respect, willingness to listen, and tolerance of opposing points of view.
- Respect for individual differences and alternative viewpoints will be maintained at all times in this class.
- One's words and use of language should be temperate and within acceptable bounds of civility and decency.
- Fighting, using profanity, personal or physical threats or insults, damaging property, may result in your removal from class in accordance with policies and procedures outlined in university policies. Further consequences may be applied through Student Conduct Regulations handled by the Office of Student Conduct and Advocacy. Substantial issues will be handled through the University Police Department.

COLLABORATION POLICIES

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

Unauthorized collaboration will result in an "F" in the course as a violation of academic integrity. This includes inappropriate posts on Piazza (the course discussion board) to the course. Inappropriate is defined as any post which violates any behavioral or academic integrity policies.

EXAM POLICY

There will be 3 exams. For all exams you are allowed to use resources that are explicitly provided to you. This is the only aspect of the course with restricted participation times.

- Each exam consists of 2 parts
    - Group collaborative assignment
        - You will work collaboratively with a small group for discussion and practice of content that in part is in a similar style to that which will be on the exam.
        - There will be two options for this assignment, you will be given the opportunity to select which 1 hour long session you will participate in.
        - This counts as 10% of the exam score.
    - Individual part
        - Two days after the practice exam you will have a 24 hour window to complete the individual part of the exam.
            - Written part: You will be given a set of questions that you will do your work by hand, on paper, then submit a digital copy of your work to UB Learns. You will get 1 submission attempt.
                - This is 45% of the score.
            - Digital part: You will have a set of questions to complete on UB Learns. This part you will have a fixed about of time to complete (30 minutes to 90 minutes depending on the exam). You will get two attempts, the final submission is the one that would count towards your grade.
                - This is 45% of your score.

Any accommodations must be made in advanced barring extraordinary circumstances.

Due Dates

Late work: No late work will be accepted. Cut offs for unit work is noted. Grading and feedback will not be provided until after the cut off date.

No work will be accepted after midnight on Friday of the last week of classes barring extraordinary circumstances.

If a review of your assignment grading is desired, you have 1 week from the time the grade is released to request a review. Corrections are not allowed, with the exception of the special policies for exam 1 (these will be detailed further prior to the exam).

Submission Policy

All submissions will be made on UBLearns in PDF form unless otherwise instructed. Any assignment involving code, must be submitted typed. You will be instructed in lecture how to generate the appropriate files for submission of assignments containing code.
Each file submitted must have your name printed clearly on the submission to be eligible for grading. Any file without your name on the work (in the filename does not count) or in a format other than instructed, will not be graded.

If you submit an incorrect file/corrupted file/empty file/not what you intended, it is your responsibility to ensure you correct this (you may simply submit again to overwrite your previous submission).

Submissions that are saved rather than submitted will not be graded and count as the final submission.

Study Time

I urge you to read the appropriate sections in the book before class and then to reread the section after class.

Similarly, take notes in class and then recopy your notes after class. All of this takes time, and doing the homework takes much more time. This type of material is new to students and should not be taken lightly. The concepts and ideas of proofs are not something you can simply memorize and regurgitate. You must understand them in order to be able to apply them to different problems.

Reading the textbook before class ideally will be completed by every student as you will be required to complete exercises before lecture. Unfortunately, some of you may try to skirt this by finding ways around completing the tasks honestly. You will find that if you

read the material and complete the problems honestly prior to lecture, you will gain much more than the small percentage of your grade.

Credit/Contact Time Expectations

In accordance with SUNY's "Credit/Contact Hour" policy, for each credit hour the normal expectation of work is an average of two hours of study outside of each lecture session for the lecture component each week for a standard term. For the laboratory component the one credit corresponds with the one lab section scheduled per week. Note that this is condensed for the summer offering, which correlates to more time per week expected.
https://www.suny.edu/sunypp/documents.cfm?doc_id=168

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.

If you need to email course staff, please include **[CSE 241]** at the beginning of the subject line so your email is not missed. **Email without this subject or from non-UB accounts will be ignored.**

Responses may be delayed outside of standard business hours and at other times you will be informed of.

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

You are expected to adhere to all university policies, including those listed below and not listed.
Academic Integrity Policy:
https://catalog.buffalo.edu/policies/integrity.html

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

Student Code of Conduct:
http://www.buffalo.edu/content/dam/www/studentlife/units/uls/student-conduct/ub-student-code-of-conduct.pdf

Classroom Behavior Expectations:
https://catalog.buffalo.edu/policies/obstruction.html

Explanation of Grades:
https://catalog.buffalo.edu/policies/explanation.html

COUNSELING SERVICE

As a student you may experience a range of issues that can cause barriers to learning or reduce your ability to participate in daily activities. These might include strained relationships, anxiety, high levels of stress, alcohol/drug problems, feeling down, health concerns, or unwanted sexual experiences. Counseling, Health Services and Health Promotion are here to help with these or other issues you may experience. You learn can more about these programs and services by contacting:

Counseling Services
120 Richmond Quad (North Campus), 716-645-2720
202 Michael Hall (South Campus), 716-829-5800
https://www.buffalo.edu/studentlife/who-we-are/departments/counseling.html

Health Services
Michael Hall (South Campus), 716-829-3316
https://www.buffalo.edu/studentlife/who-we-are/departments/health.html

Office of Health Promotion
114 Student Union (North Campus), 716-645-2837
https://www.buffalo.edu/studentlife/who-we-are/departments/health-promotion.html

Sexual Violence

UB is committed to providing a safe learning environment free of all forms of discrimination and sexual harassment, including sexual assault, domestic and dating violence and stalking. If you have experienced gender-based violence (intimate partner violence, attempted or completed sexual assault, harassment, coercion, stalking, etc.), UB has resources to help. This includes academic accommodations, health and counseling services, housing accommodations, helping with legal protective orders, and assistance with reporting the incident to police or other UB officials if you so choose. Please contact UB's Title IX Coordinator at 716-645-2266 for more information. For confidential assistance, you may also contact a Crisis Services Campus Advocate at 716-796-4399.

Please be aware UB faculty are mandated to report violence or harassment on the basis of sex or gender. This means that if you tell me about a situation, I will need to report it to the Office of Equity, Diversity and Inclusion. You will still have options about how the situation will be handled, including whether or not you wish to pursue a formal complaint. Please know that if you do not wish to have UB proceed with an investigation, your request will be honored unless UB's failure to act does not adequately mitigate the risk of harm to you or other members of the university community. You also have the option of speaking with trained counselors who can maintain complete confidentiality. UB's Options for Confidentially Disclosing Sexual Violence provides a full explanation of the resources available, as well as contact information. You may call UB's Office of Equity, Diversity and Inclusion at 716-645-2266 for more information, and you have the option of calling that office anonymously if you would prefer not to disclose your identity.

Diversity

The UB School of Engineering and Applied Sciences considers the diversity of its students, faculty, and staff to be a strength, critical to our success. We are committed to providing a safe space and a culture of mutual respect and inclusiveness for all. We

believe a community of faculty, students, and staff who bring diverse life experiences and perspectives leads to a superior working environment, and we welcome differences in race, ethnicity, gender, age, religion, language, intellectual and physical ability, sexual orientation, gender identity, socioeconomic status, and veteran status.

All people have the right to be addressed and referred to in accordance with their personal identity. In this class, we will have the chance to indicate the name that we prefer to be called and, if we choose, to identify pronouns with which we would like to be addressed...I will do my best to address and refer to all students accordingly and support classmates in doing so as well.

Department 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.

Copyright Policy

Materials used in connection with this course may be subject to copyright protection under Title 17 of the United States Code. Under certain Fair Use circumstances specified by law, copies may be made for private study, scholarship, or research. Electronic copies should not be shared with unauthorized users. If a user fails to comply with Fair Use restrictions, he/she may be liable for copyright infringement.

For more information on the SUNY policy of copyright ownership regarding materials in courses: http://system.suny.edu/academic-affairs/faculty/faculty-ownership/

Tentative Schedule

The schedule and content is subject to change. Please pay attention to announcements on Piazza, UB Learns, and via email for details about important dates and changes.

Please refer to the following calendar for the schedule:
https://drive.google.com/file/d/1MGPjaS_zKeyHd9_ASvE-3Vetsnx08--0/view?usp=sharing

Important Dates

First Day of Classes: May 26
Last Day to Drop/Add: June 1
Last Day to Resign: July 21
Last Day of Classes: August 14

All content in the syllabus is subject to change based on the needs of the class and the discretion of the instructor*

Date of last update: May 21, 2020