

# ECE 275 — Sequential Logic Systems

## Spring 2025 (In-person)

### Learning objectives

By the end of this course, a student in this course will be able to:

- Design combinational circuits by hand: Limited to 2-level 5-input digital combinational circuits.
- Design sequential circuits by hand: Limited to n-input, m-state (where  $n+m \leq 5$ ).
- Design arbitrary digital circuits by using System Verilog.

### Details

*Credits:* 3 credits

*Web page:* <https://vikasdhiman.info/ECE275-25-Sequential-Logic>

*Text:* David M. Harris, Sarah L. Harris - Digital Design and Computer Architecture, (Publisher: Morgan Kaufmann). You can download textbooks from [annas-archive.org](https://annas-archive.org)

*Additional books:*

- Fundamentals of Digital Logic with Verilog Design (3rd ed.) by Brown and Vranesic.
- Charles Roth, Jr. - Fundamentals of Logic Design (6th Edition) -Cengage Learning (2009)

*Prerequisite:* ECE 177

### Instructors

**Vikas Dhiman** Barrows Hall Rm 279, [vikas.dhiman@maine.edu](mailto:vikas.dhiman@maine.edu)

Office hours: Friday 3:30-5:30 PM By appointment: <https://calendar.app.google/dDYMEbxvX7q12GEK7>

### Teaching assistants

- Danila Borodaenko [danila.borodaenko@maine.edu](mailto:danila.borodaenko@maine.edu)

### Expected time commitment per week

- Classes: 3 hrs
- Review and homework: 3 hrs
- Labs: 3 hrs

## Grading and expectations

Expected time commitment per week: 9 hrs: Classes: 3 hrs, Review and homework: 3 hrs, Labs: 3 hrs.

Grading is an unfortunate necessity. Grades are based on the following split. Please note the emphasis on homeworks and labs.

- Homework: 30%
  - Weekly; 9 homeworks; due at the beginning of the class.
- 2 mid-terms and final (Feb. 24, Apr. 7, May 13): 30% total (10% each).
  - Closed book.
- Labs: 25%
  - 6-labs; expected to be finished in lab; the deliverable is expected next week.
- Project: 15%
  - Extensions to the pong-game

There will be no make-ups for missed exams; plan to be there. Late work – at most one late homework; and one late lab is allowed. Please use your allowance responsibly. Collaboration – studying in groups is encouraged for understanding, but working the problems should be worked on your own. No collaboration when you are writing down the homework. Grading will be based on absolute scale 90% (A)/80% (B)/70% (C)/60% (D).

**Lab reports** The students will submit the labs in writing (preferably digital format including Verilog files, screenshots and pictures). We will create a brightspace assignment for each lab and ask students to upload relevant files and answers. Lab reports should be short proof of works in response to the lab manuals. You do not need to write prose for the report or repeat the material from lab manuals. In the lab reports include:

1. Answers to the questions in lab manuals.
2. Verilog code that you wrote.
3. Screenshots or pictures showing that it worked.
4. It is mandatory for everyone to attend the labs in person and get their task checked off by TAs.
5. All reports must be submitted individually.
6. It must have proper snaps attached of any work/calculation you did in your notebook; Verilog code and FPGA kit with proper output demonstrated.

## Tests

Tests will be closed book, with one A4 size paper as cheat-sheet allowed. Calculators will neither be needed nor allowed.

## **Labs**

We will have labs throughout the semester. Please attend in person on your assigned lab day. Each student will be provided hardware. By accepting this hardware, the student is agreeing to return the hardware in good condition at the end of the semester.

## **Project**

We will be learning Verilog throughout the course, less in the class, more in the labs. By the end of the course, you should know enough Verilog to implement a Pong game on the FPGA board. The labs are designed to help you implement a very basic version of Pong game step by step. Final project will be to add a fancier feature to the already implemented pong game.

Here are some examples from what students did last year:

1. Ethan Demouro and David Peitz
2. Landon and Stevens
3. Will and Henry
4. Tic tac toe sample project

## **Approximate Course Schedule**

Please click [https://docs.google.com/spreadsheets/d/e/2PACX-1vT\\_z0AyQfbKGDzBrqQ3i3uDthFGjRWnKxjb5cYGLC5Mc8aSBXfjiU4gfk5jp1u1Co-Tjw4EoadyDKg5/pubhtml?gid=1765543150&single=true](https://docs.google.com/spreadsheets/d/e/2PACX-1vT_z0AyQfbKGDzBrqQ3i3uDthFGjRWnKxjb5cYGLC5Mc8aSBXfjiU4gfk5jp1u1Co-Tjw4EoadyDKg5/pubhtml?gid=1765543150&single=true)

## **Mask policy**

Masks are required in the class so that people at risk feel safe and welcome to the class.

## **Academic Honesty Statement**

Academic honesty is very important. It is dishonest to cheat on exams, to copy term papers, to submit papers written by another person, or generated by software or systems without the explicit approval of the instructor, to fake experimental results, or to copy or reword parts of books or articles into your own papers without appropriately citing the source. Students committing or aiding in any of these violations may be given failing grades for an assignment or for an entire course, at the discretion of the instructor. In addition to any academic action taken by an instructor, these violations are also subject to action under the University of Maine Student Conduct Code. The maximum possible sanction under the student conduct code is dismissal from the University. Please see the University of Maine System's Academic Integrity Policy listed

in the Board Policy Manual as Policy 314 (\*Date Issued: September 1, 2020):  
<https://www.maine.edu/board-of-trustees/policy-manual/section-314/>

### **Students Accessibility Services Statement**

If you have a disability for which you may be requesting an accommodation, please contact Student Accessibility Services, 121 East Annex, [um.sas@maine.edu](mailto:um.sas@maine.edu), 207.581.2319, as early as possible in the term. Students may begin the accommodation process by submitting an accommodation request form online and uploading documentation at [https://umaine-accommodate.symplicity.com/public\\_accommodation/](https://umaine-accommodate.symplicity.com/public_accommodation/). Once students meet with SAS and eligibility has been determined, students submit an online request with SAS each semester to activate their approved accommodations. SAS creates an accessibility letter each semester which informs faculty of potential course access and approved reasonable accommodations; the letter is sent directly to the course instructor. Students who have already been approved for accommodations by SAS and have a current accommodation letter should meet with me (Vikas Dhiman [vikas.dhiman@maine.edu](mailto:vikas.dhiman@maine.edu)) privately as soon as possible.

### **Course Schedule Disclaimer**

In the event of an extended disruption of normal classroom activities (due to COVID-19 or other long-term disruptions), the format for this course may be modified to enable its completion within its programmed time frame. In that event, you will be provided an addendum to the syllabus that will supersede this version.

### **Observance of Religious Holidays/Events**

The University of Maine recognizes that when students are observing significant religious holidays, some may be unable to attend classes or labs, study, take tests, or work on other assignments. If they provide adequate notice (at least one week and longer if at all possible), these students are allowed to make up course requirements as long as this effort does not create an unreasonable burden upon the instructor, department or University. At the discretion of the instructor, such coursework could be due before or after the examination or assignment. No adverse or prejudicial effects shall result to a student's grade for the examination, study, or course requirement on the day of religious observance. The student shall not be marked absent from the class due to observing a significant religious holiday. In the case of an internship or clinical, students should refer to the applicable policy in place by the employer or site.

### **Sexual Discrimination Reporting**

The University of Maine is committed to making campus a safe place for students. Because of this commitment, if you tell any of your teachers about sexual discrimination involving members of the campus, *your teacher is required to*

*report* this information to Title IX Student Services or the Office of Equal Opportunity.

Behaviors that can be “sexual discrimination” include sexual assault, sexual harassment, stalking, relationship abuse (dating violence and domestic violence), sexual misconduct, and gender discrimination. Therefore, all of these behaviors must be reported.

**Why do teachers have to report sexual discrimination?** The university can better support students in trouble if we know about what is happening. Reporting also helps us to identify patterns that might arise – for example, if more than one victim reports having been assaulted or harassed by the same individual.

**What will happen to a student if a teacher reports?** An employee from Title IX Student Services or the Office of Equal Opportunity will reach out to you and offer support, resources, and information. You will be invited to meet with the employee to discuss the situation and the various options available to you.

If you have requested confidentiality, the University will weigh your request that no action be taken against the institution’s obligation to provide a safe, nondiscriminatory environment for all students. If the University determines that it can maintain confidentiality, you must understand that the institution’s ability to meaningfully investigate the incident and pursue disciplinary action, if warranted, may be limited. There are times when the University may not be able to honor a request for confidentiality because doing so would pose a risk to its ability to provide a safe, nondiscriminatory environment for everyone. If the University determines that it cannot maintain confidentiality, the University will advise you, prior to starting an investigation and, to the extent possible, will share information only with those responsible for handling the institution’s response

The University is committed to the well-being of all students and will take steps to protect all involved from retaliation or harm.

*If you want to talk in confidence* to someone about an experience of sexual discrimination, please contact these resources:

*For confidential resources on campus:* Counseling Center: 207-581-1392 or Cutler Health Center: at 207-581-4000.

*For confidential resources off campus:* Rape Response Services: 1-800-871-7741 or Partners for Peace: 1-800-863-9909.

*Other resources:* The resources listed below can offer support but may have to report the incident to others who can help:

For support services on campus: Title IX Student Services: 207-581-1406, Office of Community Standards: 207-581-1409, University of Maine Police: 207-581-4040 or 911. Or see the OSAVP website for a complete list of services.