Course Syllabus

Course Information

CS 4341
Digital Logic and Computer Design
Fall 2024

Section 003
Time: Monday, Wednesday, 8:30-9:45am
Location: ECSS 2.312
Modality: Face-To-Face, In-Person

Section 006
Time: Monday, Wednesday, 11:30am-12:45pm
Location: ECSW 1.355
Modality: Face-To-Face, In-Person

Professor Contact Information

Dr. Alice Wang
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Building: Engineering and Computer Science South (ECSS)
Office: 3.609
Office Hours: Mondays 10-11am

Teaching Assistant: To be assigned

I do not read e-Learning e-mails. Please use my UTD e-mail account above for any communications. If you are sending an e-mail, kindly start the subject line with the ***course number*** and ***section***.

Example:
To: alice.wang@utdallas.edu
Subject: CS4341-003: What is a memory?

If you are asking a question about the homework, post the question to the discussion board. I will only answer questions there.

Course Pre-requisites, Co-requisites, and/or Other Restrictions

Prerequisites:
(CE 2310 or EE 2310) Introduction to Digital Systems or (CS 2340 or SE 2340) Computer Architecture and PHYS 2326 Electromagnetism and Waves

Corequisite:
CS 4141 Digital Systems Laboratory to accompany CS 4341.

The purpose of this laboratory is to give students an intuitive understanding of digital circuits and systems. Laboratory exercises include construction of simple digital logic circuits using prototyping kits and board-level assembly of a personal computer. Students that have credit for CS 2110 have credit for this course and cannot get additional credit for this course.

Restrictions:
Credit cannot be received for both courses, CS 4341 and (CE 3320 or EE 3320). Students that have completed CS 4340 cannot get credit for this course.

Additional:
If you drop the lab, you have to drop the lecture. If you drop the lecture, you have to drop the lab.

Course Description

CS 4341 - Digital Logic and Computer Design (3 semester credit hours) Boolean algebra and logic circuits; synchronous sequential circuits; gate level design of ALSU, registers, and memory unit; register transfer operations; design of datapath and control unit for a small computer; Input-Output interface.

Student Learning Objectives/Outcomes

Students will be working problems and employing methods, including but not limited to:

- CLO1: Ability to analyze, minimize and design gate-level combinational logic circuits using Boolean algebra and 3 and 4 variable Karnaugh Maps.
- CLO2: Ability to analyze and design simple synchronous sequential circuits.
- CLO3: Ability to analyze, design and utilize digital logic components such as adders, multiplexers, decoders, registers, and counters.
- CLO4: Ability to understand RAM and ROM memory components, and utilize these in digital logic design.

In addition, students will study and become aware of

- CLO5: Ability to design computer components such as Arithmetic-Logic-Unit (ALU) and data path.
- CLO6: Ability to understand the basics of hardware description languages such as Verilog or Virtual Hardware Design Language (VHDL).

Required Textbooks and Materials

- Harris, D. Harris, S., Digital Design and Computer Architecture, Morgan Kauffman, Second edition, 2013. ISBN:978-0-12-394424-5.
- Other material to be discussed in class

Suggested Course Materials

- Dally. W., Harting, R.C., Digital Design – A System Approach, Cambridge University Press, 2012
- Brock J. LaMeres, Introduction to Logic Circuits & Logic Design with Verilog, Springer, Second Edition, 2019, ISBN: 978-3-030-13604-8 or 978-3-030-13605-5 (eBook).
- CircuitVerse (www.circuitverse.org)
- Edaplayground (www.edaplayground.com)
- Drawing software and circuit software: DigitalIO, Logisim, Visio, DrawIO, or other freeware.

Assignments & Academic Calendar

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.

Lectures

L#	Date	Lecture	Readings	HW due
L01	Mon, Aug 19	Introduction: From Bits to BIOS		
L02	Wed, Aug 21	Verilog - an Introduction and demo	Chapter 4	
L03	Mon, Aug 26	Simple Logic Gates and Equations	Chapter 1	
L04	Wed, Aug 28	Number Systems (review)	Chapter 2	HW #1
	Mon, Sep 2	***Labor Day - Holiday, No class***		
L05	Wed, Sep 4	Combo Logic I - Intro to Combo Logic (SOP, POS)	Chapter 2	
L06	Mon, Sep 9	Combo Logic II - Boolean Algebra	Chapter 2	HW #2
L07	Wed, Sep 11	Combo Logic II - Simplifying Boolean logic	Chapter 2	
L08	Mon, Sep 16	Combo Logic III - Karnaugh Maps	Chapter 2	
L09	Wed, Sep 18	Combo Logic IV - Complex Blocks, Timing	Chapter 2	
L10	Mon, Sep 23	Transistor-level design	Chapter 1	HW#3
	Wed, Sep 25	**Exam I Review**		
	Mon, Sep 30	**Exam I (testing center)**		
L11	Wed, Oct 2	Seq Logic I - Latches, DFF	Chapter 3	
L12	Mon, Oct 7	Seq Logic II - Common Seq circuits	Chapter 3	HW#4
L13	Wed, Oct 9	Seq Logic III - FSM & verilog	Chapter 3	
L14	Mon, Oct 14	Seq Logic IV - More FSM examples	Chapter 3	
L15	Wed, Oct 16	Seq Logic V - Timing	Chapter 3	
L16	Mon, Oct 21	CPU Architecture (review) and Microarchitecture I	Chapter 6	HW#5
	Wed, Oct 23	**Exam II Review**		
	Mon, Oct 28	**Exam II (testing center)**		
L17	Wed, Oct 30	Logic blocks I - Register File	Chapter 5	
L18	Mon, Nov 4	Logic blocks II - Memories (RAM, ROM)	Chapter 5	
L19	Wed, Nov 6	Logic blocks III - ALU, Subtractor, Comparator, Status	Chapter 5	
L20	Mon, Nov 11	Logic blocks IV - CPU controllers	Chapter 5	HW#6
L21	Wed, Nov 13	Logic blocks V - Adder Deep Dive	Chapter 5	
L22	Mon, Nov 18	Logic blocks VI - Shifter, Multiplier, Divider	Chapter 5	
L23	Wed, Nov 20	CPU Microarchitecture II	Chapter 7	
	Mon, Nov 25	***Fall break - Thanksgiving - No class***		
	Wed, Nov 27	***Fall break - Thanksgiving - No class***		
	Mon, Dec 2	Advanced topics		HW#7
	Wed, Dec 4	**Final Exam Review**		
	tbd	**Final Eam (location: tbd)**		

Grading Policy - Assignment Weight

Type	#
Exam I	20%
Exam II	20%
Final Exam	20%
Homeworks	40%
Total	100%

Grading Scale

Score	Grade
93.0 - 100	A
90.0 - 92.9	A-
83.0 - 89.9	B
80.0 - 82.9	B-
73.0 - 79.9	C
70.0 - 72.9	C-
60.0 - 69.9	D
Below 60.0	F

Programming Assignment Grading

You will receive deductions if your verilog code:

Does not have .v or .sv as the file extension: -5%
Does not have your name and other header information: -5%
Does not exit properly ($finish). -5%
Is not properly commented (every section): -15%
Doesn’t compile/assemble: -30%

Course & Instructor Policies

Expectations of Student Skills

All students are expected to be aware of how to:

- how to create a PDF
- how to download and install software on a computer
- how to perform arithmetic operations
- how to perform logic operations
- how to walk through an algorithm
- how to write a computer program

and most importantly:

- how to read a problem
- how to read the entire problem

Science is Dispassionate

- Science, Engineering, and Mathematics are dignified disciplines.
- Pleading for grades is unacceptable for this course.
- Bargaining for grades is unacceptable for this course.
- If you miss your assignments and exams in the semester due to
    - Prolonged illness
    - Family concerns
    - Internships
    - Employment
    - Other personal choices
- Then ***you should drop this course.***

Late work

- If a situation occurs on campus, such as inclement weather, power outage, or network outage, or server problems, then assignments will be extended at the discretion of the instructor.
- Otherwise, no late assignment will be accepted.

Exams

- The current assignment plan for this semester is to have three exams: two midterm exams and one final exam
- All midterm exams will be at the Testing Center and seat reservation is required.
    - Review the Student Guidelines.
    - Seat reservations must be made for each exam and should be done at the beginning of the semester via this link. If you do not reserve your seat you will not be able to take the exam and I cannot do anything about it, so do not email me if you cannot take an exam because you failed to reserve your seat.
- The final exam date, time and location is TBD during finals week.
- You can bring 1 double sided sheet to the exam. Cheat sheets must be handwritten and contain no printed materials.
- You can bring a scientific calculator to the exam. You cannot bring a graphing calculator
- There will be no makeup exams under normal circumstances.

Class Attendance

The University's attendance policy requirement is that individual faculty set their course attendance requirements. Regular and punctual class attendance is expected. Students who fail to attend class regularly are inviting scholastic difficulty. In some courses, instructors may have special attendance requirements; these should be made known to students during the first week of classes.

Students are expected to attend every lecture. Absences are the responsibility of the student.

Class Participation

Regular class participation is expected. Students who fail to participate in class regularly are inviting scholastic difficulty. A portion of the grade for this course is directly tied to your participation in this class. It also includes engaging in group or other activities during class that solicit your feedback on homework assignments, readings, or materials covered in the lectures (and/or labs). Class participation is documented by faculty. Successful participation is defined as consistently adhering to University requirements, as presented in this syllabus. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Inappropriate behavior is not acceptable.

This course is a lecture course at a branch of the University of Texas. The instructor does not care about the policies of previous courses, previous universities, or previous nations. The argument that a student's behavior was acceptable in another instructor's course or institution does not apply to the current course.

FORMAL NOTICE: No form of bias is permitted in this course, including the use of crude humor. Anyone harassing the instructor, grader, or fellow student with inappropriate comments will fail the course. This includes references written into computer programs, answering "joke" emails in class, or playing inappropriate videos. The instructor will decide what is inappropriate.

Class Materials

The instructor may provide class materials that will be made available to all students registered for this class as they are intended to supplement the classroom experience. These materials may be downloaded during the course, however, these materials are for registered students' use only. Classroom materials may not be reproduced or shared with those not in class, or uploaded to other online environments except to implement an approved Office of Student Accessibility accommodation. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Class Recordings

Students are expected to follow appropriate University policies and maintain the security of passwords used to access recorded lectures. Unless the Office of Student Accessibility has approved the student to record the instruction, students are expressly prohibited from recording any part of this course. Recordings may not be published, reproduced, or shared with those not in the class, or uploaded to other online environments except to implement an approved Office of Student

Accessibility accommodation. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Due to the catalog requirements for this course, the lectures will not be recorded on a regular basis.

Cheating
Attempting to or succeeding in gaining an unfair advantage in the academic arena is an act of academic dishonesty. Plagiarism, Collusion, and Fabrication are three examples of cheating.

Plagiarism
"To submit to your instructor a paper or comparable assignment that is not truly the product of your own mind and skill is to commit plagiarism." The most obvious is quoting entire sections of a text or research paper and claiming it is original work. Be sure to cite your sources, and acknowledge the work of others, or learn how to paraphrase but do not forget to footnote.

Collusion
Giving your work out to another source, even if its "Please let me see your code. I promise I will not copy.." is collusion. This includes email, securing cloud services such as BOX or GitHub, even just handing off a thumb drive. Sometimes this is deliberate…sometimes one student has stolen another's work. Sitting down together with different machines and talking and discussing and comparing output is not collusion. Handing off entire completed assignments is collusion.

Fabrication
Submitting a result for a grade, and it turns out the references do not exist. Or writing a program that generates an output without performing any algorithm. For example, turning in a computer program with nothing but output statements while ignoring all the inputs and configurations required by the project is fabrication.

A Fourth Form Of Cheating, Theft
Many students use software and servers such as GitHub and Google Drive to manage documents and programming code. ***It is the responsibility of the student to ensure that their accounts are secure***. If one student has accessed the account of another student ***with or without*** permission, then both students will be considered culpable. Why? The first student for taking the information, and the second student for being negligent.

When Academic Dishonesty occurs, I ask the students involved to see me. Depending on the outcome of that interview, I proceed to the next step and submit the forms to the university. If a student is found in violation of academic conduct, the result will be a -100 (not a 0) on the entire assignment.

Comet Creed
This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:

"As a Comet, I pledge honesty, integrity, and service in all that I do."

Academic Support Resources
The information contained in the following link lists the University's academic support resources for all students.

Please see http://go.utdallas.edu/academic-support-resources.

UT Dallas Accommodation Policy

The University of Texas at Dallas is committed to providing reasonable accommodations for all persons with disabilities. The syllabus is available in alternate formats upon request. If you are seeking classroom accommodations under the Americans with Disabilities Act (2008), you are required to register with the Office of Student AccessAbility, located in the Administration Building, Suite 2.224. Their phone number is 972-883-2098, email: studentaccess@utdallas.edu and website is https://studentaccess.utdallas.edu. To receive academic accommodations for this class, please obtain the proper Office of Student AccessAbility letter of accommodation and meet with me at the beginning of the semester."

UT Dallas Syllabus Policies and Procedures
The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus. Please review the catalog sections regarding the credit/no credit or pass/fail grading option and withdrawal from class.

Please go to http://go.utdallas.edu/syllabus-policies for these policies.

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