Course Information

CS/CE/TE 4341-001 Digital Logic and Computer Design Fall 2020

Time: Monday, Wednesday, 11:30-12:45 Room: ECSW 1.355

> Due to the COVID-19 Pandemic, this course has been designated to be Modality 3, Hyflex

Professor Contact Information

Instructor: Dr. Eric William Becker Telephone: (972) 883-3862 Email: Eric.Becker@utdallas.edu Office: ECSS 3.407 Office Hours:

- Monday, 1:00pm to 2:30pm
- Wednesday, 1:00pm to 2:30pm

Please, if you are sending Dr. Becker an e-mail, please start the subject line with the course number and section.

Example:

Subject: CS4341-001: Question about Homework 40

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

Prerequisites:

(<u>CE 2310</u> or <u>EE 2310</u>) Introduction to Digital Systems or (<u>CS 3340</u> or <u>SE 3340</u> or <u>TE 3340</u>) Computer Architecture and <u>PHYS 2326</u>. Electromagnetism and Waves

Corequisite:

(<u>CS 4141</u> or <u>TE 4141</u>). (Same as <u>TE 4341</u>) 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, ($\underline{CS 4341}$ or $\underline{TE 4341}$) and ($\underline{CE 3320}$ or $\underline{EE 3320}$). Students that have completed CS 4340 cannot get credit for this course.

Course Description

<u>CS 4341</u> - 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 data path and control unit for a small computer; Input-Output interface.

Course 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

Mano, M. Morris and Ciletti,, Michael D., Digital Design, Pearson, 6th Edition, 2018

Some form of Verilog: Recommend using SystemVerilog or iVerilog (Freeware)

Suggested Course Materials

Dally. W., Harting, R.C., Digital Design - A System Approach, Cambridge University Press, 2012

Harris, D. Harris, S., Digital Design and Computer Architecture, Morgan Kauffman Second edition, 2013

Grading Policy

The semester will be scored on a scale from 0 to 100 points.

Dr. Becker does not curve.

Do not bother to ask

Assignment	Weight
Homework 1	6%
Homework 2	7%
Homework 3	6%
Homework 4	6%
Project	25%
Midterm Exam	25%
Final Exam	25%
Total	100%

Score	Grade
Above 97	A+
93-96	А
90-92	A-
87-89	B+
83-86	В
80-82	B-
70-79	С
60-69	D
Below 60	F

Key Grade Dates				
Midterm Exam	October 12 th through October 16 th			
Final Project November 20 th				
Final Exam	December 2 nd through December 8 th			

Note: CS 4141 is a separate class with a separate semester grade.

Assignments & Academic Calendar

As Instructor for this course, I reserve the right to change this calendar as I see fit-Dr. Becker

Date	Day	Week	Topics	Homework
17-Aug	Mon	1	Introduction	
19-Aug	Wed	1	Introduction	Project Assigned
21-Aug	Fri	1		
24-Aug	Mon	2	Digital Systems and Binary Numbers	
26-Aug	Wed	2	Digital Systems and Binary Numbers	Homework 1 Assigned
28-Aug	Fri	2		č
31-Aug	Mon	3	Boolean Algebra and Logic Gates	
2-Sep	Wed	3	Boolean Algebra and Logic Gates	
4-Sep	Fri	3	5 5	Project Cohort Due
7-Sep	Mon	4	LABOR DAY	
9-Sep	Wed	4	Laboratory Review	
11-Sep	Fri	4		Homework 1 Due
14-Sep	Mon	5	Gate-Level Minimization	Homework 1 Answers
16-Sep	Wed	5	Gate-Level Minimization	Homework 2 Assigned
18-Sep	Fri	5		e
21-Sep	Mon	6	Combinational Logic	
23-Sep	Wed	6	Combinational Logic	
25-Sep	Fri	6	-	Project Update 1
28-Sep	Mon	7	Synchronous Logic	· · ·
30-Sep	Wed	7	Synchronous Logic	
2-Oct	Fri	7		Homework 2 Due
5-Oct	Mon	8	Synchronous Logic	Homework 2 Answers
7-Oct	Wed	8	Synchronous Logic	
9-Oct	Fri	8		
12-Oct	Mon	9	Q&A in Class	MIDTERM EXAM ASSIGNED
14-Oct	Wed	9	Q&A in Class	
16-Oct	Fri	9		MIDTERM EXAM DUE
19-Oct	Mon	10	What is an ALU?	
21-Oct	Wed	10	Module Concept	Homework 3 Assigned
23-Oct	Fri	10		
26-Oct	Mon	11	Return Exam	
28-Oct	Wed	11	Registers and Counters	
30-Oct	Fri	11	Registers and Counters	Project Update 2
2-Nov	Mon	12	Memory and Programmable Logic	
4-Nov	Wed	12	Memory and Programmable Logic	Homework 4 Assigned
6-Nov	Fri	12		Homework 3 Due
9-Nov	Mon	13	Design at the Register Transfer Level	Homework 3 Answers
11-Nov	Wed	13	Design at the Register Transfer Level	и 145
13-Nov	Fri	13		Homework 4 Due
16-Nov	Mon	14	Review	Homework 4 Answers
18-Nov	Wed	14	Bonus Presentation Day	
20-Nov	Fri	14	N. cl	PROJECT DUE
23-Nov	Mon	Fall Break	No Class	
23-Nov	wed	Fall Break	No Class	
27-Nov	Fri M	Fall Break	No Class	
30-Nov	Mon	15	EDIAL EXAM Online Of A stall st	
2-Dec	wed	15	FINAL EAAM - Unline Q&A at class time	SSSI ACT OUANCE
4-Dec	Fri	15		>>>LASI CHANCE<<<
/-Dec	Mon	16	FINAL EXAM - Unline Q&A at class time	Einal Evan Dua
o-Dec	1 ue	10	FINAL EAAWI DUE	r mai Exam Due

Course & Instructor Policies

Hyflex Teaching

Dr. Becker will present his lectures in the classroom at the correct time, and the entire class is not required to be present. As of the writing of this document, the classroom can be at most a 1/3 capacity. This means a third of the students can come to lecture 1, the next third to lecture 2, and the final third to lecture 3, and then the first third would come back on lecture 4. Specifics are pending at this time.

I do not expect or require anyone to show up to the lecture. But I allow all students the option of coming to the lecture hall for the first 1/3 seating. If necessary, the class will go to a full online class.

Asynchronous Teaching

Asynchronous teaching means that you may watch my lecture videos at any time of the day during the period that I cover that topic. Some of my students are in other time zones, and even other continents. I also plan to leave the recordings in place over the course of the semester.

Attendance Policies:

I will have no attendance taking this semester. You will each be responsible for your own actions, which include following along in class. You are adults, and we are in the midst of a pandemic. What this means for my students is I will not interrupt the current topic to go back to a previous topic, or jump ahead to a future topic.

Make-up Exams:

If you submit an exam online, then you have taken the exam. If you miss an exam online, then I will use the final exam grade as a substitute. If you miss turning in the final exam, you will receive an incomplete for the semester and have to schedule a make-up exam.

Late Work

I typically have the homework and other assignments due on a Friday, "End-of-Day." Students are expected to have read the instructions and to know the time an assignment is due. If E-learning/Blackboard has an error, and the instructor is informed, an extension will be granted. If the instructor decides that the class could use another week, then the instructor will grant an extension.

Late Work – Last Chance Friday

If you have a regrade request, on the midterm, a problem with turning in the project, or other issue, Dr. Becker will have a "Last Chance" folder. If necessary, you will turn in any assignment you want him to check, along with a readme explaining the situation in that folder. Slept through the end of the project and didn't turn it in? Last chance. Want the midterm regraded? Last chance. Want to turn in a homework-No. Dr. Becker will have posted his answer key by then, so homework's cannot have a last chance.

The Final Exam and Hackathons

Dr. Becker is extremely fond of announcing his students have placed in an academic event, such as a Hackathon. Even with the current pandemic, online Hackathons are being held. If a student should place in top three prizes, or a special sponsor prize, and present their work to the class, that student will be excused from the final exam with a flat grade of 100. *A Hackathon with only three teams and no prize is not significant.*

To achieve this goal, the student must do the following:

- **1. PRESENT TO THE CLASS**
- 2. Describe the competition, including the location and number of participants
- 3. State how they placed in the Hackathon. First, Second, Third, or a Sponsor Prize is acceptable
- 4. Demonstrate the significant prize that was won. A \$50.00 gift card is not a significant prize. A thousand

dollars in equipment, cash, or internship offers are examples of significant prizes.

- **5.** Demonstrate their project
- **6.** Take questions from the other students.

Trying to substitute another event in place of a programming contest is not acceptable.

Extra Credit

Dr. Becker sometimes includes an extra credit feature on the project or an extra question on the exams.

HyFlex Teaching

All course materials, assignments, lectures, and exams will be done online. Seating in the classroom during the lecture is allowed so long as the guidelines on social distancing, hygiene, and masks are observed. I currently plan on using Blackboard and the Blackboard Collaborate system. If the University should upgrade their software, then the system will change.

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Classroom Citizenship

- Now Asynchronous. Be on time
- Now Hyflex. Depending on the lecture, you may be asked to put away electronic devices, be called to be quiet, return to your seat, or to put backpacks away.
- Dr. Becker has a very bad habit of allowing students to ask off-topic questions...and then putting the off-topic questions on quizzes and exams. *Anything covered in class is fair game, including this syllabus.*
- Science, Engineering, and Mathematics are dignified disciplines. Pleading for grades is unacceptable for this course.
- Also, inappropriate behavior is not acceptable.

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.

Bargaining and Cutting Deals

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 the student's behavior was acceptable in another instructor's course or institution does not apply to the current course.

- Students may not make a deal to drop the lowest homework.
- Students may not make a deal to do extra homework.
- Students may not make a deal to get out of an exam.
- Students may not make a deal to get out of a project.
- Students may not make a deal to get out of attendance.

All the material in this syllabus, on homework, and on exams will be the same for everyone in the class, equally. This class is not a tv game show, Anything extra for the course will be announced on the first day of class, and all students will have an equal opportunity to earn a bonus.

Ethical Behavior

Plagiarism is the unacknowledged incorporation of another's work into work which a student offers for credit. Using source code of another person's program, even temporarily or from the web, is considered *plagiarism*. Example: Someone putting their name on someone else's homework assignment and turning it in is cheating.

Collusion is the unauthorized collaboration of another person in preparing work that a student offers for credit. Allowing another person to use your source code, even temporarily, is considered *collusion*. Example: Giving someone your homework, and then that person turns it in as their own work, then the giver is also guilty of cheating.

Dr. Becker's penalty for any form of dishonesty is a score of -100 on the entire assignment.

Study Groups and Cohorts

This is a graduate level course. Students are allowed to create a study group, I am fine with students working together so long as they *correctly acknowledge each other's work and they are transparent to their instructor and their peers.* Each student in a study group still has to turn in their own copy of their assignment.

If you do work together, and your work is similar, and you did not acknowledge your study group, the instructor and the grader will make the standard assumptions of plagiarism and collusion and mark the assignment -100.

Study groups are good for discussing the problem, comparing the output, and checking each other's code for simple errors. If you form a study group, have fun with it! Give it a cool name, write up a membership charter, get a group account on a server.

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."

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 go to <u>http://go.utdallas.edu/syllabus-policies</u> for these policies.

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