Course Syllabus – Fall 2023

Course CS 4341 – 501
Course Title Digital Logic & Computer Design
Term Fall 2023
Meetings TR 5:30 - 6:45 PM

Professor Contact Information

Dr. Omar Hamdy
Email: omar.hamdy@utdallas.edu
Tel: 972-883-2692
Office: ECSS 3.206

Office Hours:

Fri 4:00 – 6:00 PM
Or by appointment

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

Pre-requisites:

CE 2310 or EE 2310: Introduction to Digital Systems **or**
CS 3340 or SE 3340 or TE 3340: Computer Architecture **and**
PHYS 2326. Electromagnetism and Waves

Co-requisites:

CS 4141 or TE 4141. (Same as TE 4341) Digital Systems Laboratory, to accompany CS 4341.

The purpose of the laboratory corequisite course 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 already have credit for this course and cannot get additional credit for this course.

Restrictions:

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

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 ALU, registers, and memory unit; register transfer operations; design of data path and control unit for a small computer; Input-Output interface.

Student Learning Objectives/Outcomes

CLO 1	Ability to analyze, minimize and design gate-level combinational logic circuits using Boolean algebra and 3 and 4 variable Karnaugh Maps
CLO 2	Ability to analyze and design simple synchronous sequential circuits
CLO 3	Ability to analyze, design and utilize digital logic components such as adders, multiplexers, decoders, registers, and counters
CLO 4	Ability to understand RAM and ROM memory components, and utilize these in digital logic design
CLO 5	Ability to design computer components such as Arithmetic-Logic-Unit (ALU) and data path
CLO 6	Ability to understand the basics of hardware description languages such as Verilog or VHSIC Hardware Design Language (VHDL)

Required Textbooks and Materials

Digital Design and Computer Architecture - Second edition (2013), Harris & Harris, Morgan Kauffman, ISBN:978-0-12-394424-5

HDL Simulator of Choice: SystemVerilog, iVerlog, VHDL, EDAPlayground (Recommended)

Suggested Course Materials

Digital Design - Sixth edition (2017), Mano & Ciletti, Pearson, ISBN: 978-0-13-454989-7

Grading Policy

Coursework Weight		Letter Grade Chart	
Assignment	**Weight**	**Score**	**Grade**
Homework 1	10%	Above 97	A+
Homework 2	10%	93-96	A
Homework 3	10%	90-92	A-
Homework 4	10%	87-89	B+
Exam 1	20%	83-86	B
Exam 2	20%	80-82	B-
Exam 3	20%	70-79	C
Above could change during the semester		60-69	D
		Below 60	F

Assignments & Academic Calendar

Exams

Exams will be a combination of simple problems, definitions, and diagram problems. Exam materials will be taken mainly from classroom lectures and textbook covered chapters and require a clear understanding of topics discussed in class. All exams will be individual work.

Assignments

Homework will consist of problems that will need to be worked out individually by each student. Each student will solve their homework on their own. Collaboration is not allowed.

Course Schedule

This is a **tentative** schedule which will be adjusted during the semester to accurately meet the class CLOs.

Week	Lecture Date	Material Covered
1	Aug. 22, 24	Class Intro, Chapter 1
2	Aug. 29, 31	Chapter 1, Chapter 2
3	Sep. 05, 07	Chapter 2
4	Sep. 12, 14	Chapter 2
5	Sep. 19, 21	Chapter 2
6	Sep. 26, 28	Chapter 2, Chapter 3
7	Oct. 03, 05	Chapter 3
8	Oct. 10, 12	Exam 1, Chapter 3
9	Oct. 17, 19	Chapter 3
10	Oct. 24, 26	Chapter 3, Chapter 4
11	Oct. 31, Nov 02	Chapter 4
12	Nov. 07, 09	Chapter 5, Exam 2
13	Nov. 14, 16	Chapter 5
Nov. 20 – 24, Fall Break & Thanksgiving Holidays		
14	Nov. 28, 30	Chapter 5
15	Dec. 05, 07	Chapter 5, Exam 2

Course & Instructor Policies

Late Work

Assignments **will not** be accepted late. Students are expected to have read the instructions and to know the time an assignment is due. If eLearning/Blackboard has an error, and the instructor is informed, an extension will be granted; otherwise, homework is due when it is due.

Makeup Exams

- Students who miss an exam or test must have a valid reason for this. The situation should be clearly described in an e-mail to Dr. Hamdy directly. For medical issues, a doctor's note is the required form of proof. If you are sick, please go to the doctor and get a note. A dental appointment or other non-emergency health situation is not an acceptable excuse for missing an examination.
- If a student sits any exam, this means the student accepts the responsibility for that exam. Once taken, the exam will not be given again, and no make-up will be scheduled.

Communication

> I do not read eLearning/Blackboard e-mails. Please use my UTD e-mail account I liked in contact information section above for any communications.

Class Attendance

> Attendance is **<u>mandatory</u>** for this class per CS Department policies. Your attendance will be the primary factor used to calculate any bonus grades. To qualify for any bonus or curve you must attend at <u>least 80%</u> of the total classes. Your qualified bonus will be proportional to the actual number of classes you attended, where you are allowed only two unexcused absences.

Ethical Behavior

> In addition to the university policies and disciplinary actions described under the Academic Integrity section below, Dr. Hamdy's response to any form of dishonesty is a score of **<u>0</u>** on the entire assignment. Any students involved will, according to Departmental Policy, be referred to the Director of Community Standards & Conduct for adjudication.

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."

Student Conduct & Discipline

> The University of Texas System and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of their business. It is the responsibility of each student and each student organization to be knowledgeable about the rules and regulations which govern student conduct and activities. General information on student conduct and discipline is contained in the UTD publication, *A to Z Guide*, which is provided to all registered students each academic year.

> The University of Texas at Dallas administers student discipline within the procedures of recognized and established due process. Procedures are defined and described in the *Rules and Regulations, Board of Regents, The University of Texas System, Part 1, Chapter VI, Section 3*, and in Title V, Rules on Student Services and Activities of the university's *Handbook of Operating Procedures*. Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations (SU 1.602, 972/883-6391).

> A student at the university neither loses the rights nor escapes the responsibilities of citizenship. He or she is expected to obey federal, state, and local laws as well as the Regents' Rules, university regulations, and administrative rules. Students are subject to discipline for violating the standards of conduct whether such conduct takes place on or off campus, or whether civil or criminal penalties are also imposed for such conduct.

Academic Integrity

> The faculty expects from its students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student for that degree, it is imperative that a student demonstrate a high standard of individual honor in his or her scholastic work.

Scholastic dishonesty includes, but is not limited to, statements, acts or omissions related to applications for enrollment or the award of a degree, and/or the submission as one's own work or material that is not one's own. As a general rule, scholastic dishonesty involves one of the following acts: cheating, plagiarism, collusion and/or falsifying academic records. Students suspected of academic dishonesty are subject to disciplinary proceedings.

Plagiarism, especially from the web, from portions of papers for other classes, and from any other source is unacceptable and will be dealt with under the university's policy on plagiarism (see general catalog for details).

Email Use

The University of Texas at Dallas recognizes the value and efficiency of communication between faculty/staff and students through electronic mail. At the same time, email raises some issues concerning security and the identity of each individual in an email exchange. The university encourages all official student email correspondence be sent only to a student's U.T. Dallas email address and that faculty and staff consider email from students official only if it originates from a UTD student account. This allows the university to maintain a high degree of confidence in the identity of all individual corresponding and the security of the transmitted information. UTD furnishes each student with a free email account that is to be used in all communication with university personnel. The Department of Information Resources at U.T. Dallas provides a method for students to have their U.T. Dallas mail forwarded to other accounts.

Withdrawal from Class

The administration of this institution has set deadlines for withdrawal of any college-level courses. These dates and times are published in that semester's course catalog. Administration procedures must be followed. It is the student's responsibility to handle withdrawal requirements from any class. In other words, I cannot drop or withdraw any student. You must do the proper paperwork to ensure that you will not receive a final grade of "F" in a course if you choose not to attend the class once you are enrolled.

Student Grievance Procedures

Procedures for student grievances are found in Title V, Rules on Student Services and Activities, of the university's *Handbook of Operating Procedures*.

In attempting to resolve any student grievance regarding grades, evaluations, or other fulfillments of academic responsibility, it is the obligation of the student first to make a serious effort to resolve the matter with the instructor, supervisor, administrator, or committee with whom the grievance originates (hereafter called "the respondent"). Individual faculty members retain primary responsibility for assigning grades and evaluations. If the matter cannot be resolved at that level, the grievance must be submitted in writing to the respondent with a copy of the respondent's School Dean. If the matter is not resolved by the written response provided by the respondent, the student may submit a written appeal to the School Dean. If the grievance is not resolved by the School Dean's decision, the student may make a written appeal to the Dean of Graduate or Undergraduate Education, and the deal will appoint and convene an Academic Appeals Panel. The decision of the Academic Appeals Panel is final. The results of the academic appeals process will be distributed to all involved parties.

Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations.

Incomplete Grade Policy

As per university policy, incomplete grades will be granted only for work unavoidably missed at the semester's end and only if 70% of the course work has been completed. An incomplete grade must be resolved within eight (8) weeks from the first day of the subsequent long semester. If the required work to

complete the course and to remove the incomplete grade is not submitted by the specified deadline, the incomplete grade is changed automatically to a grade of **F**.

CSMC

The Computer Science Mentoring Center (CSMC) is a free resource available to all students taking this class. The CSMC provides assistance in many areas including:
- o Understanding core concepts related to this class
- o Developing a logical framework for a program
- o Connecting programming constructs to the logic of the program
- o Assisting in solving syntax and logical errors in your code
- o Exam reviews and reworks (by faculty request)

The mentors will meet with you 1-on-1 to address your specific problem areas. Their goal is to help you understand what is wrong and how to fix it, but they will not do the work for you. For more information about the CSMC, including location and hours of operation, please visit http://csmc.utdallas.edu.

Disability Services

The goal of Disability Services is to provide students with disabilities educational opportunities equal to those of their non-disabled peers. Disability Services is located in room 1.610 in the Student Union. Office hours are Monday and Thursday, 8:30 a.m. to 6:30 p.m.; Tuesday and Wednesday, 8:30 a.m. to 7:30 p.m.; and Friday, 8:30 a.m. to 5:30 p.m.

The contact information for the Office of Disability Services is:
The University of Texas at Dallas, SU 22
PO Box 830688
Richardson, Texas 75083-0688
(972) 883-2098 (voice or TTY)

Essentially, the law requires that colleges and universities make those reasonable adjustments necessary to eliminate discrimination on the basis of disability. For example, it may be necessary to remove classroom prohibitions against tape recorders or animals (in the case of dog guides) for students who are blind. Occasionally an assignment requirement may be substituted (for example, a research paper versus an oral presentation for a student who is hearing impaired). Classes enrolled students with mobility impairments may have to be rescheduled in accessible facilities. The college or university may need to provide special services such as registration, note-taking, or mobility assistance.

It is the student's responsibility to notify his or her professors of the need for such an accommodation. Disability Services provides students with letters to present to faculty members to verify that the student has a disability and needs accommodations. Individuals requiring special accommodation should contact the professor after class or during office hours.

Religious Holy Days

The University of Texas at Dallas will excuse a student from class or other required activities for the travel to and observance of a religious holy day for a religion whose places of worship are exempt from property tax under Section 11.20, Tax Code, Texas Code Annotated.

The student is encouraged to notify the instructor or activity sponsor as soon as possible regarding the absence, preferably in advance of the assignment. The student, so excused, will be allowed to take the exam or complete the assignment within a reasonable time after the absence: a period equal to the length of the absence, up to a maximum of one week. A student who notifies the instructor and completes any missed exam or assignment may not be penalized for the absence. A student who fails to complete the exam or assignment within the prescribed period may receive a failing grade for that exam or assignment.

If a student or an instructor disagrees about the nature of the absence [i.e., for the purpose of observing a religious holy day] or if there is similar disagreement about whether the student has been given a reasonable time to complete any missed assignments or examinations, either the student or the instructor may request a ruling from the chief executive officer of the institution, or his or her designee. The chief executive officer or designee must take into account the legislative intent of TEC 51.911(b), and the student and instructor will abide by the decision of the chief executive officer or designee.

Off-Campus Instruction and Course Activities

Off-campus, out-of-state, and foreign instruction and activities are subject to state law and University policies and procedures regarding travel and risk-related activities. Information regarding these rules and regulations may be found at the website address given below. Additional information is available from the office of the school dean. (http://www.utdallas.edu/Business Affairs/Travel_Risk_Activities.htm)

These descriptions and timelines are subject to change at the discretion of Dr. Omar Hamdy.