# EENG 4010.011/5940.011 Digital Design Techniques
## Course Syllabus
## FALL 2021
### University of North Texas
### Electrical Engineering

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**Date Prepared:** Aug. 17, 2021

**Prepared by:** Elias Kougianos

Instructor: Elias Kougianos
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Course web site: http://canvas.unt.edu
Time: MW 4:00—5:20 PM
Meeting Place: NTDP D215

## Course Number, Title, Credit Hours:

EENG 4740 Digital Design Techniques, 3 Credit Hours

## Course Description:

Three semester credit hours. Study of modern digital circuit implementation technologies, with emphasis on Field-Programmable Gate Arrays (FPGAs). Traditional and computer-based digital synthesis techniques for combinational and sequential circuits are covered. Complex systems, such as reaction timers, processors and buses, are built from simpler circuits. A modern hardware description language, such as Verilog or VHDL, is used throughout the course.

**Prerequisite(s):** EENG 2710 (Digital Logic Design), and EENG 2711 (Digital Logic Design Lab).

## Course Topics:

- Introduction – Design concepts and the design process.
- Review of digital design techniques.
- Introduction to the Verilog Hardware Description Language.
- Implementation technology.
- Optimized implementation of logic functions.
- Combinational circuit building block design in Verilog.
- Synchronous sequential circuits in Verilog.
- Algorithmic State Machines (ASMs) and Finite State Machines with Datapath (FSMDs). Design and implementation in Verilog.
- Digital system design examples using CAD tools and Verilog.
- Asynchronous sequential circuits.
- Testing, validation, and verification of digital systems using Verilog.

## Textbook(s) and/or required material:

- Fundamentals of Digital Logic with Verilog Design, 3$^{rd}$ Ed., Brown, Stephen and Vranesic, Zvonko, McGraw Hill, 2013, ISBN-10 0073380547, ISBN-13 978-0073380544
- Additional material will be provided during the course and will be available on Canvas. A Verilog simulator, such as Intel FPGA Modelsim (Starter Edition) will be used throughout the course. The software is available free of charge from:
  https://www.intel.com/content/www/us/en/programmable/downloads/download-center.html

## Grading:

- Exam 1: 30%
- Exam 2: 30%
- Final: 40%

Grading scale (based on total course points):

| | |
|---|---|
| 90% - 100% | A |
| 80% - 89.99% | B |
| 70% - 79.99% | C |
| 60% - 69.99% | D |
| 00% - 59.99% | F |

NOTES:
The exam schedule is as follows:
Test 1 is on Wednesday September 29$^{th}$ (Week 6) in NTDP D215$^*$
Test 2 is on Wednesday November 10$^{th}$ (Week 12) in NTDP D215$^*$
**The final exam will take place on SATURDAY December 4$^{th}$ 1:30PM – e:30PM in NTDP D215$^*$**
**\*  Students with preapproved ODA arrangements will take all tests (including the final) at the ODA Test Center**

**During each test (including the final exam) you can consult a printout of the Canvas slides and any other pre-approved handouts (they will be announced prior to the tests). No notes, textbooks or other material. During tests the use of electronic devices such as cell phones, smart phones, smart watches, pagers, photographic devices and/or other electronic or communication devices, with the exception of calculators, is strictly prohibited. Such devices must be turned off during the tests. You may also be asked to leave you backpacks by the classroom door.**

## Missed Exams:

You will be allowed to make up a missed exam only if you have a documented university excused absence and received prior approval. For more details visit the UNT Dean of Students' web page: https://deanofstudents.unt.edu/resources

## Grade-related policies:

**Turnaround Time**

I aim to return graded work (tests) to you within one week of the test date. When this is not possible, I will send an announcement to the class.

**Grade Disputes**

You are required to wait 24 hours before contacting me to dispute a grade. Within that time, I expect that you will review the assignment details and reflect on the quality of the work you turned in. **You should then contact me to arrange a meeting to discuss the issue.** You should come to our scheduled meeting with specific examples that demonstrate that you earned a higher grade than you received. If you miss your scheduled meeting, you forfeit your right to a grade dispute. If you do not contact me to schedule a meeting within seven days of receiving your grade, you also forfeit your right to a grade dispute.

**Extra Credit**

There are no extra credit opportunities in this course.

## Academic Dishonesty:

Cheating will not be tolerated. Anyone found guilty of cheating on a test or assignment will be awarded an F grade for the course. Discussions of problems and assignment with your classmates is welcome and encouraged, however, sharing of solutions is not. If you need help, you should ask the instructor. Cheating includes, but is not limited to, all forms of plagiarism and misrepresentation. For your rights and responsibilities please refer to **http://www.unt.edu/csrr**

## Disabilities Accommodation:

The University of North Texas complies with Section 504 of the 1973 Rehabilitation Act and with the Americans with Disabilities Act of 1990. The University of North Texas provides academic adjustments and auxiliary aids to individuals with disabilities, as defined under the law. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring accommodation, please see the instructor and/or contact the Office of Disability Access at 940-565-4323 during the first week of class. Information and requests for supporting letters can be obtained from: https://disability.unt.edu/

## Additional Policies and Procedures:

1. Attendance is mandatory. 3 unexcused absences will result in automatic course drop. If you know ahead of time that you will miss a class, contact me via email in advance. Attendance will be spot checked. For COVID-19 cases, see the statement below.
2. State common law and federal copyright laws protect my lectures. They are my own original expression. Whereas you are authorized to take notes in class thereby creating a derivative work from my lecture, the authorization extends only to making one set of notes for your own personal use and no other use. You are not authorized to record my lectures, to provide your notes to

anyone else or to make any commercial use of them without expressed prior permission from me. Synchronous (live) sessions in this course will be recorded for students enrolled in this class section to refer to throughout the semester. Class recordings are the intellectual property of the university or instructor and are reserved for use only by students in this class and only for educational purposes. Students may not post or otherwise share the recordings outside the class, or outside the Canvas Learning Management System, in any form. Failing to follow this restriction is a violation of the UNT Code of Student Conduct and could lead to disciplinary action.

3. This syllabus is subject to change at any time during the semester with changes to be announced in class.
4. An I (incomplete) grade is given only for extenuating circumstances and in accordance with University and Departmental Policies.
5. To comply with FERPA policies, I will communicate via email (email me at elias.kougianos@unt.edu) **but I will only respond to UNT email accounts.**
6. Each student should retain graded lecture notes, pop quizzes, homework, tests, software-generated files, and laboratory reports to document errors in recorded grades.
7. Challenges to the course grade must be presented within 60 days of receipt of grade notices mailed by the university. This will ensure that instructor's records are still available to allow a review of the assigned grade. You should first discuss your complaint with the instructor. If you wish to carry it further, contact the Program Coordinator by calling (940) 891-6872. To further pursue your complaint, contact the Department Chair, but ONLY after first discussing your concern with the previous two individuals
8. The Student Perceptions of Teaching (SPOT) is a requirement for all organized classes at UNT. This short survey will be made available to you at the end of the semester, providing you a chance to comment on how this class is taught. I am very interested in the feedback I get from students, as I work to continually improve my teaching. I consider SPOT to be an important part of your participation in this class.

## COVID-19 Impact on Attendance

While attendance is expected as outlined above, it is important for all of us to be mindful of the health and safety of everyone in our community, especially given concerns about COVID-19. Please contact me if you are unable to attend class because you are ill, or unable to attend class due to a related issue regarding COVID-19. It is important that you communicate with me prior to being absent so I may make a decision about accommodating your request to be excused from class.

If you are experiencing any symptoms of COVID-19 (https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html) please seek medical attention from the Student Health and Wellness Center (940-565-2333 or askSHWC@unt.edu) or your health care provider PRIOR to coming to campus. UNT also requires you to contact the UNT COVID Hotline at 844-366-5892 or COVID@unt.edu for guidance on actions to take due to symptoms, pending or positive test results, or potential exposure. While attendance is an important part of succeeding in this class, your own health, and those of others in the community, is more important.