University of North Texas, College of Engineering
Department of Electrical Engineering

EENG 2710: Digital Logic Design

Zoom Link for Class:  https://unt.zoom.us/j/89802345492
Classes Will Not Be Recorded

Spring 2021
Tuesdays and Thursdays 10:00 - 11:20 AM
Classroom: Remote

Instructor
- Dr. R. Thomas Derryberry, Office: NTDP B240 Email: tom.derryberry@unt.edu
Office Hours: Monday, Tuesday, Wednesday, and Thursday, 1:00 – 2:30 PM
Monday, Tuesday, Wednesday, and Thursday, 4:00 – 4:30 PM

Zoom link for Office Hours: https://unt.zoom.us/j/3400611223
(Additional appointments can be requested by email using your my.unt.edu account.)

While I want to make myself as available as possible to each of you, I do have to place some limitations on when I can be contacted. I would prefer that most general questions go through the Q & A forum in the Discussion Board area. If you have a general question about the course or assignments, please post it there. Either I will answer it, or, one of your classmates will. This way we can all benefit from questions asked, and they can be answered in a venue that the whole class can see. You may also want to find someone in class to be a "buddy" with. This will give you at least one other person who you can email with questions.

If you have a private question, please contact me via email and I will respond within 24 hours on weekdays (usually sooner). Please do not expect a response over the weekend.

- GA: TBD, Office Hours: TBD, Email: TBD

Course Description
- Introduction to digital computers and information processing systems, Boolean algebra, principles and methodology of logic design, machine language programming, register transfer logic, microprocessor hardware, software and interfacing, fundamentals of circuits and systems, computer organization and control, memory systems, and arithmetic unit design.
Prerequisites
• Engineering or Engineering Technology majors.

Co-requisite
• EENG 2711 – Digital Logic Design lab for Electrical Engineering Majors

Course Webpage
• All the course related material will be posted on the course webpage which is available through Canvas (https://unt.instructure.com).

Course Objectives
1. **Know** what digital systems are, **how** they differ from analog systems and **why** it is advantageous to use the digital systems in **many applications**.
2. **Comprehend** different number systems including the binary system and Boolean algebraic principles.
3. **Apply** Boolean algebra to switching logic design and simplification.
4. **Analyze** a given digital system and decompose it into logical blocks involving both **combinational** and **sequential circuit** elements.
5. **Synthesize** a given system starting with problem requirements, identifying and designing the building blocks, and then integrating these blocks into a complete system.
6. **Validate** the system functionality and evaluate the relative merits of different designs.

Required Textbook

Course Requirements and General Policies
• Class attendance is mandatory. Lectures and class discussions will contain vital information needed to do well on the exams.
• The students are required to come prepared to every class with the material discussed in the previous 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.
Class Materials for Remote Instruction
The UNT fall schedule requires this course to have fully remote instruction beginning November 28th. Additional remote instruction may be necessary if community health conditions change or you need to self-isolate or quarantine due to COVID-19. Students will need access to a [webcam and microphone – faculty member to include what other basic equipment is needed] to participate in fully remote portions of the class. Additional required classroom materials for remote learning include: [list specific software, supplies, equipment or system requirements needed for the course]. Information on how to be successful in a remote learning environment can be found at https://online.unt.edu/learn.

- Everyone must turn in individual homework. Homework must be done individually (you will learn the most from this). Any evidence of group participation or simply copying other's homework will be treated and interpreted as academic dishonesty.
- Please remember to turn off phones prior to class. Please note that portable phones, pagers, and late arrivals are disruptive to the instructor and to your peers. The use of cell phones, beepers, or communication devices is disruptive and is therefore absolutely prohibited during class or while taking exams or quizzes. Turn off your cell phone while in class. If I catch you using these devices, your final grade will be reduced by 10% for each and every transgression and you will be asked to leave the class. Except in emergencies, students using such devices must leave the classroom for the remainder of the class period. I know that some of you may wish to take notes directly on your computer and I have no problem with that. If however, you choose to access your email, search the web, play games, or instant messenger your friends during class, you will have 5% deducted from your final grade for each and every transgression. This penalty will be at the sole discretion of the instructor. If for some reason I am late arriving to class, it will be because of circumstances beyond my control. You are expected to remain for 15 minutes past the scheduled class start time while I attempt to communicate my situation and relay instructions.
- Please do not wait until the last minute. If you are having trouble with this class, please stop by my office during my office hours. I am also available by email. NOTE: I will correspond via email ONLY if you use your my.unt.edu student account. Anything else will be ignored and deleted.
- Please visit http://www.unt.edu/csrr for your rights and responsibilities.

Disability Accommodation
- The University of North Texas (UNT) complies with Section 504 of the 1973 Rehabilitation Act and with the Americans with Disabilities Act of 1990. UNT 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 Accommodation (http://www.unt.edu/oda) at 940-565-4323 during the first week of class. It is the responsibility of students with certified disabilities to provide the instructor with appropriate documentation from the Dean of Students Office.
Assignments, Quizzes, and Exams

- Students are expected to practice good time management skills. Hence there will be a 25% reduction on assignments received within 24 hours after the due date and no emailed assignments will be accepted, except in extenuating circumstances. Homework is due before the class in the following week.
- Exams will be based on textbook readings, handouts, class exercises, class lectures, discussions, and homework assignments. Students are responsible for all text material, regardless of whether we review the text material in class or not.

Secret to Success in this Course (Shsssh, don’t tell anyone!)

- To do well in this course, you should be thoroughly familiar with this material. However, several years of research and practice including many trial and error attempts have resulted in the development of this long sought after but elusive recipe to success. The best kept secret to achieving success in this course is cordially shared with you below:
  1. Read and comprehend the required text (Yes, you have to read!).
     a. Know and explain how to correctly solve the examples provided in the text independently.
  2. Know and explain how to correctly solve the homework assignments independently.
  3. Know and explain how to correctly solve the programming assignments independently.
  4. Arrive on time, engage in, and practice active listening for all of the class lectures.
- By the way, there are rumors this recipe works very well when applied to other courses.

Grading Policies

- There will be no extra credit.
- No make-up quizzes or exams will be offered unless prearranged with the instructor for a university approved absence.
- You have 1 week to contest any grade once returned.
  o Assuming there is a GA/TA for the course, you must first contact them regarding a grade dispute prior to seeing me.
- Failure to achieve passing performance for the composite score from both Part 1 and Part 2 will result in a final course grade of F.

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<thead>
<tr>
<th></th>
<th>PART 1</th>
<th>PART 2</th>
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<tbody>
<tr>
<td>Homework</td>
<td>10%</td>
<td>Midterm Exam</td>
</tr>
<tr>
<td>Quizzes (Unannounced)</td>
<td>30%</td>
<td>Final Exam</td>
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<tr>
<td>Totals</td>
<td>40%</td>
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- Keep all of your graded assignments, quizzes, and tests for study and review. You should track your own progress using Canvas or other appropriate means and be aware of current grades throughout the term however the official gradebook will be my Excel spreadsheet. I will make all the effort to return the graded assignments, but it’s your responsibility to collect back the graded assignments from the grader or the instructor if it is not given back to you. A composite course score will be computed for the grading assessment. Failure to achieve passing performance for the composite
score will result in a final course grade of F. Once passing performance has been
determined, the final grading for the composite course score will be done as follows:
A > 90%, 90% > B > 80%, 80% > C > 70%, 70% > D > 60% and F < 60%. Grades will
be curved if deemed necessary. Grades cannot be changed after they have been
electronically entered into the university’s system except for instructor error. Any
extenuating circumstances that may adversely affect your grade must be brought to
my attention before the final course grades are recorded. To be considered, such
circumstances must be unusual, unavoidable, and verifiable.

Academic Dishonesty

- All the provisions of the University code of academic integrity apply to this course. Any
student found to have participated in academic dishonesty will receive an F in the
class, a record of the offense will be kept in the Office of the Dean of Students, and
may be subject to further disciplinary action. Acts of academic dishonesty include but
are not limited to: academic fraud (e.g. changing solutions to appeal a grade), copying
or allowing one's work to be copied, fabrication/falsification, plagiarism, sabotage of
others' work, substitution (e.g. taking an exam for someone else). In addition, it is my
understanding and expectation that your signature on any test or assignment means
that you neither gave nor received unauthorized aid. For homework and lab
assignments, while discussion is allowed, direct copying is not and students must turn
in individual submissions. Realize that mastery of the material in the homework and
lab assignments will be essential for good performance on the exams! All students are
required to know, observe and help enforce the UNT Code of Student Academic
Integrity.
Course Outline and Tentative Schedule

All course materials, including syllabus, lecture notes, homework assignments, and grades are available in Canvas at https://unt.instructure.com

• **First Day of Class, Jan. 12, Tuesday, 10:00 - 11:20 AM**
• Topic 0  Syllabus, Grading Policy, etc.
• Topic 1  Introduction to Digital and Analog Systems
• Topic 2  Number Systems and Codes
• Topic 3  Boolean Algebra, SOP & POS Forms and Simplification
• Topic 4  Minterms/Maxterms & Applications of Boolean Algebra – Truth Tables and Incomplete Functions – Introduction to Karnaugh Maps
• Topic 5  Karnaugh Maps with 4 & 5 Variables – Prime Implicants – Quine-McCluskey method
• Topic 6  Multi-Level Gate Circuits – NAND and NOR Gates
• Topic 7  Combinational Circuit Design and Simulation Using Gates
• Topic 8  Multiplexers, Decoders, and Programmable Logic Devices
• Topic 9  Latches and Flip-Flops – Registers and Counters
• Topic 10 Analysis of Clocked Sequential Circuits
• Topic 11 Derivation of State Graphs and Tables – Reduction of State Table State Assignment
• Topic 12 Sequential Circuit Design
• Topic 13 Other topics (Time-permitting), e.g. Digital Logic Testing, Economics
• **Midterm Exam, February 25 OR March 4, Thursday, 10:00 – 11:20 PM**
• **Final Exam, Apr 29, Thursday, 8:00 - 10:00 AM**

Course Learning Outcomes (CLOs)

Course Learning Outcomes (CLOs), that is, the areas for student learning in this course are:

[CLO-1] Digital and Analog Systems: Basic Concepts and Historical Perspective
[CLO-2] Number Systems and Digital Logic Gates
[CLO-3] Boolean Algebra, Switching Functions and Canonical Forms
[CLO-5] Sequential circuit elements and sequential logic circuits
[CLO-6] Modular Sequential Logic – Counters and shift registers
[CLO-7] Analysis and Design of synchronous sequential circuits
Useful Links

- UNT Catalogs: [http://www.unt.edu/catalog/](http://www.unt.edu/catalog/)
- Office of the Registrar: [http://essc.unt.edu/registrar/](http://essc.unt.edu/registrar/) (schedule of classes and exams, etc.)
- Eagle Student Services Center: [http://essc.unt.edu/](http://essc.unt.edu/)
- Canvas: [https://unt.instructure.com](https://unt.instructure.com)

Last updated: 01/11/2021