EENG 2710.001
Digital Logic Design
Spring 2026

University of North Texas
Electrical Engineering

Instructor

Lei Zhan
Email: *lei.zhan@unt.edu*

Meeting Time and Classroom

Tuesday & Thursday 10:00 – 11:20 am, NTDP E266

Office Hours

Tuesday and Thursday, 11:30 am – 1:30 pm, NTDP E245F

***Note*:** You are encouraged to discuss any questions you have during office hours. If you are unable to come at these times, please make an appointment in advance via e-mail.

Check Canvas frequently for updated class information.

Textbook

Fundamentals of Logic Design, 7th Edition, C. H. Roth, Jr., L. L. Kinney, and E. B. John, Cengage Learning, Inc., 2021. ISBN: 978-1-337-62035-2.
https://www.cengage.com/c/fundamentals-of-logic-design-enhanced-edition-7e-roth-jr/9781337620352/

Reading Assignments

The best learning material is the textbook. It is important that you carefully read all sections discussed in class. The students are required to come to every class, knowing the material covered in the previous class.

Course Description

Overview; switching theory; combinational logic circuits; modular design of combinational circuits; memory elements; sequential logic circuits; digital system design; fault models and testing.

Prerequisite(s)

Engineering or engineering technology majors.

Co-requisite(s)

EENG 2711 (which must be completed with a grade of C or better) for Biomedical Engineering (Bioinstrumentation track), Computer Engineering, and Electrical Engineering majors.

Course Topics

1. Number Systems and Digital Logic Gates
2. Boolean Algebra, Switching Functions and Minterm and Maxterm Expansions
3. Combinational Circuit Minimization, Analysis, and Synthesis
4. Sequential Circuits Elements and Sequential Logic Circuits
5. Modular Sequential Logic – Registers and Counters
6. Analysis and Design of Synchronous Sequential Circuits

Course Objectives

Upon successful completion of this course, students will be able to:

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.

Course Learning Outcomes (CLOs)

Course Learning Outcomes (CLOs), i.e., 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 Minterm and Maxterm Expansions
[CLO-4]	Combinational Circuit Minimization, Analysis, and Synthesis
[CLO-5]	Sequential Circuit Elements and Sequential Logic Circuits
[CLO-6]	Modular Sequential Logic: Registers and Counters
[CLO-7]	Analysis and Design of Synchronous Sequential Circuits

Course Requirements

1. Homework must be submitted on the due date. 10% will be deducted for late homework. No homework will be accepted after 24 hours unless a formal letter is provided regarding a medical or family emergency.
2. There will be both announced and unannounced quizzes administered during the semester to evaluate understanding of relevant materials.
3. There will be no make-up exams/quizzes given unless prearranged with the instructor for a university approved absence.
4. Class attendance is required. Lectures and class discussions will contain vital information needed to help you understand the material and do well on the exams.
5. Keep all your graded assignments, and tests for study and review. You should track your own progress using Canvas and be aware of current grades throughout the semester.
6. Requests for reviewing of graded work must be e-mailed to the TA within a week after grading. You must **first** contact TA regarding a grade dispute prior to seeing me.
7. Students are expected to communicate to the instructor any issue regarding their performance in class ahead of time. Please do not wait until the last minute.

Course Outline and Tentative Schedule

WEEK	TOPIC	READING ASSIGNMENT
1st Week (1/12/2026)	Course Introduction Number Systems and Conversion Binary Arithmetic Negative Numbers Binary Codes	1.1 – 1.5
2nd Week (1/19/2026)	Boolean Algebra Laws of Boolean Algebra	2.1 – 2.8
3rd Week (1/26/2026)	SOP & POS Forms & Simplification Minterms/Maxterms & Applications of Boolean Algebra	3.1 – 3.5 4.1 – 4.3
4th Week (2/2/2026)	Truth Tables and Incomplete Functions Introduction to Karnaugh Maps Karnaugh Maps with 4 & 5 Variables	4.4 – 4.7 5.1 – 5.7
5th Week (2/9/2026)	Prime Implicants Quine-McCluskey method	6.1 – 6.6
6th Week (2/16/2026)	NAND and NOR Gates Multi-Level Gate Circuits	7.1 – 7.7
7th Week (2/23/2026)	Combinational Circuit Design Gate Delays Timing Diagrams and Hazards	8.1 – 8.4
8th Week (3/2/2026)	Multiplexers Buffers Decoders and Encoders ROMs **Midterm Exam**	9.1 – 9.5
(3/9-3/15/2026)	**Spring Break**	
9th Week (3/16/2026)	Latches	11.1 – 11.3
10th Week (3/23/2026)	Flip-Flops Registers	11.4 – 11.10 12.1 – 12.2
11th Week (3/30/2026)	Counters	12.3 – 12.6
12th Week (4/6/2026)	Analysis of Clocked Sequential Circuits	13.1 – 13.4
13th Week (4/13/2026)	Derivation of State Graphs and Tables	14.1 – 14.6
14th Week (4/20/2026)	Reduction of State Table State Assignment	15.1 – 15.9
15th Week (4/27/2026)	Sequential Circuit Design Review for final exam Pre-finals week	16.1 – 16.3
Final Exam	**7:30-9:30am, Thursday, 5/7/2023**	

All course materials, including syllabus, lecture slides, homework assignments, and grades will be available on Canvas at https://unt.instructure.com.

Grading

1. Attendance: 5%
2. Homework: 25%
3. Quizzes: 25%
4. Midterm Exam: 20%
5. Final Exam: 25%

Scales (based on total course point)

90 – 100	A
80 – 89	B
70 – 79	C
60 – 69	D
0 – 59	F

Official gradebook will be my Excel spreadsheet.

Useful Links

1. If you are having trouble with the class materials, please take advantage of The Learning Center's Lead Tutors. You can access all their services through their website: https://learningcenter.unt.edu/tutoring.
2. UNT Academic Calendar: https://registrar.unt.edu/exams/final-exam-schedule/spring
3. Office of the Registrar: http://essc.unt.edu/registrar (schedule of classes and exams, etc.)
4. Eagle Student Services Center: http://essc.unt.edu/

Course Technology and Skills Required for this class

Students will need access to a set of minimum technological resources and skills to succeed in this class.

Minimum Technology Requirements

1. Computer
2. Reliable internet access and web browser
3. Canvas Technical Requirements (https://clear.unt.edu/supported- technologies/canvas/requirements)

Computer Skills and Digital Literacy

Course-specific technical skills that learners must have to succeed in the course:

1. Using Canvas for accessing materials and grades as well as submitting files if needed
2. Converting files to PDF
3. Using emails with attachments
4. Downloading and installing software
5. Using spreadsheet programs

Technical Assistance

Contact Student Help Desk for help with Canvas or other technology issues.
UNT Help Desk: UNT Student Help Desk site (http://www.unt.edu/helpdesk/index.htm)
Email: helpdesk@unt.edu Phone: 940-565-2324
In Person: Sag Hall, Room 130 Walk-In Availability: 8am-9pm

For additional support, visit Canvas Technical Help (https://community.canvaslms.com/docs/DOC- 10554-4212710328)

Rights and Responsibilities

1. University rules require that any student caught cheating or copying from another student receive a failing grade for the course and be reported to the department for appropriate action. In this course, the exams are individual assignments, and any collaboration will be considered cheating. Collaborative effort on homework is acceptable, but you must cite your collaborators, and the written text of the homework must be your own. Similarly, other reference texts that you use on homework must be cited. Please visit http://www.unt.edu/csrr/ for your rights and responsibilities.
2. 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. It is the responsibility of the student to provide the instructor with appropriate documentation from the Dean of Students Office (see http://www.unt.edu/oda) **during the first week of class**.

Class Evaluation by Students

The SPOT (Student Perceptions of Teaching) evaluation is a requirement for all organized classes at UNT and will be available for your input at the end of the semester.

Information provided in the syllabus is subject to change.