EE 210: Digital Circuits

Section 01E, Course Syllabus, Fall 2025

Rev 1, 8/4/2025

INSTRUCTOR INFORMATION

Instructor	Gerald L. Fudge, PhD
Office Location	AG/ET 217
Office Hours	Monday – Friday, except Wed. (10:00 am – 11:00 am) Wednesday (10:00 am – 11:30 am) Also, by appointment at other times
Phone	Engineering &Technology Office: 903-886-5474
University Email Address	Gerald.Fudge@etamu.edu
Preferred Form of Communication	Email or per in-class discussion
Communication Response Time	Typically within 48 hours on weekdays for email

COURSE INFORMATION

Class Meeting Schedule	See schedule at end of syllabus
Class Meeting Dates	Tuesday 2-4:30 pm (lecture), Thurs 2-4:30 (lab)
Classroom	AG/ET 211 (lecture), 214 (lab)
Textbook(s) Required	• Lab Manual for Digital Fundamentals, 11th edition by Thomas L. Floyd and David Buchla, 2014 printing by Pearson, 978-0133514391
Software Required	Microsoft Office - MS Word, PowerPoint
Optional Texts and/or Materials	Multisim (available on school computers)

COURSE DESCRIPTION

This course introduces theory and design of digital logic circuits, including number systems, Boolean algebra, logic gates, combinational and sequential circuit design and analysis, Karnaugh maps, truth tables, logic optimization, arithmetic circuits, flip-flops, counters, memory and storage, synchronous and asynchronous state machines, and introduction to programmable logic. The course has an associated Laboratory experiments set, which will require the use of simulation software (e.g. Multisim and PSpice) and hardware equipment.

Prerequisites: PHYS 2426 with a minimum grade of C or concurrent enrollment or COSC 1436 with a minimum grade of C.

Student Learning Outcomes

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

- Perform conversions and numerical calculations in different number systems (including decimal, binary, gray code, & hexadecimal) and be able to perform 2's complement calculations in binary
- Recognize the function of logic gates and how they connect and operate together as a system
- Design digital logic circuits using Boolean algebra
- Apply Karnaugh Maps technique to simplify, analyze, optimize digital logic circuits
- Design and implement combinational logic circuits using basic logic gates and medium scale integration (MSI) technology such as Adders, Subtractors, Comparator, Multiplexers, Decoders, etc.
- Design and implement sequential logic circuits using flip-flops, registers, counters, etc.
- Design and program basic synchronous and asynchronous state machines
- Use software tools such as MULTISIM to design and simulate digital logic circuits
- Use software tools to perform simple programming of FPGAs using Verilog or VHDL
- Perform experiments/course project independently as well as in a group
- Conduct experiments using discrete components, breadboard, logic analyzer, clock generator, function generator, seven segment display, etc.
- Write a technical lab report

COURSE REQUIREMENTS

Minimal Technical Skills Needed

Working knowledge and basic skills in using Microsoft Office products Word, Excel, and PowerPoint. Working knowledge and understanding of basic algebra laws and electrical circuits fundamentals (Ohms Law) per high school physics.

Instructional Methods

The instructional methods in this course include lectures, class discussion, course project, written assignments, problem solving, writing a lab report, lab exercises, open-ended problems, case study, and simulation assignments using software.

Student Responsibilities or Tips for Success in the Course

- **Attendance & Participation**: On-time attendance is required. Students must show up ready to participate with proper attire. Attendance & Participation is a graded component because for optimum learning, students need to attend class and participate in all activities. See grade policy on missed classes below. Students should inform the instructor if they need to miss class. Student should bring a scientific calculator to class to support participation.
- **Lab Safety Training**: Students registered for this course must complete all required lab safety training prior to entering the lab and undertaking any activities. Once completed, Lab Safety Training is valid for the remainder of the same academic year (i.e., through the following August) and must be completed anew in subsequent years. There are no exceptions to this University policy. Failure to complete the required training will preclude participation in any lab activities, including those for which a grade is assigned
- **Homework Assignments**: Working through example problems is a critical component to learning. Late work may be penalized, including a grade of zero, unless student has an acceptable excuse proven by a doctor's note or other legal documentation.
- **Quizzes**: Quizzes will be used to assess problem solving skills and provide student feedback. In-class quizzes will be given to help reinforce the material. Unless otherwise specified, these must be turned in during the class; late submissions are not allowed.
- **Projects**: Students will be expected to work together in team projects, similar to real-world engineering, and to document via in-class presentation, soft-copy presentation, and engineering report. Peer reviews will be collected for group projects to support group evaluation of team member performance.
- **Assignment Submission**: Students shall submit assignments either in class or in the assigned drop boxes on D2L. If problems are encountered using D2L, then email may be used as a backup with instructor permission.
- **Collaboration**: Students are strongly encouraged to collaborate, but must turn in their own work. Teamwork is an integral aspect of engineering.
- **Soft-Copy Report Formats**: Students should submit reports in PDF format. File names must adhere to the file name requirements as follows: ee210f2025_groupX_labY_report.pdf, where X = group # and Y = lab #. For example, ee210f2025_group3_lab4_report.pdf would be the report from group #3 for lab assignment #4. Lab reports will use the provided template.
- **Exams**: The exams will be closed book & closed notes unless otherwise specified. Student may bring a scientific calculator. The use of a personal phone is prohibited during exams. A makeup exam may be offered but an official permit for absence that fulfills University procedures may be required by the instructor. See policy on midterm grades in the grading section.
- **Shoes & Attire**: This course requires laboratory work, and thus suitable attire will be required to minimize the risk of injury. Hoodies should not be worn over the head during the lab, nor should blue tooth and similar devices be worn in the ears during the lab.
- **Use of Artificial Intelligence (AI) Tools**: Except as specified, AI tools, ChatBots, and other software that has the capacity to generate code or closed form solutions is prohibited. Any use of such software must be documented. Any undocumented use of such software constitutes an instance of academic dishonesty (plagiarism). The instructor will provide assignment directions for assignments involving the use of generative AI, and will discuss in class.

GRADING

Final grades in this course will be based on the following scale:

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

Grade Policy on Missed Classes. The table below shows the potential grade penalty for unexcused absences. Coming late to class counts as half of an absence.

# of unexcused absences	< 4	4	5	6	7	>7
Grade penalty	0%	5%	10%	20%	30%	F

Overall grades will be based on a weighted average as shown below. Note that midterm grades below 90% will require correction and in-person review with the instructor. Also note that on lab reports, all students in the group will receive the same score for each report.

Assessment Type	**Percent**
Participation and Attendance	10
Homework	15
Lab Exercises	15
Project	15
Quizzes	10
Exams	35
Total	**100**

Note: There may also be opportunities for bonus points; these will be discussed in class.

Required D2L Lab Safety Training Course

As a new campus wide initiative to ensure compliance with system requirements, to improve efficiency and streamline processes, the Department of Environmental Health and Safety has created a required Student Laboratory Safety Training that is required for this course. When students register for this class, they will automatically be enrolled in the D2L "Lab Safety Training" Course per the below policy:

- Students will have access the D2L "Lab Safety Training" course on the first-class day.
- Students, by default, has a Compliance Hold "OH" placed on their Banner Profile; this will be removed once student completes the training.
- Students will receive email notification prior to the start of term and then once per day for the first 5 days of the semester. The students will also receive notification through D2L's Pulse App via Intelligent Agents.
- Students that have not completed the training within the first 5 days of the start of term will begin getting an email notification on the 6th day indicating that their access to the courses associated to this training has been restricted. Restriction and Access to course(s) will be handled via the custom web-application. Student with restricted access may encounter additional penalties if they are not able to submit assignments on time; thus it is critical that students complete the D2L “Lab Safety Training” course within the first 5 days of the semester.

- Students will continue to get a daily email notification until the training is complete (Instructors will be copied so they are aware).
- On the 21st day of the term, students that have not completed the training will be notified via email that they have been dropped from this course.
- The D2L “Lab Safety Training” course is separate from the specific ENGR 110 safety training that takes place during the first week of class.

Note: Personal computer and internet connection problems do not excuse the requirement to complete all course work in a timely and satisfactory manner. Each student needs to have a backup method to deal with these inevitable problems. These methods might include the availability of a backup PC at home or work, the temporary use of a computer at a friend's home, the local library, office service companies, Starbucks, a ETAMU campus open computer lab, etc.

ABET Accreditation

This course will assess the achievement of ABET student outcomes #2 and #6:

2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

- 2.1 Define requirements specifications (scope) and constraints for the component or system to be designed
- 2.2 Develop a feasible design to comply with required needs
- 2.3 Describe and specify activities/procedures and resources necessary to implement the system.
- 2.4 Verify the component/system design against the design constraints and requirements specifications

6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

- 6.1 Identify and describe experiment goals, related theorical concepts and resources to be used.
- 6.2 Execute a systematic and structured experiment with organized data.
- 6.3 Analyze and critically interpret data using appropriate tools.
- 6.4 Draw meaningful conclusions and produce a high-quality technical report.

Course Outline / Calendar

Wk.	Days		Unit / Topic	Notes
	Tues.	Thur.		
1	8/26	8/28	W1: Intro, lab & safety, number systems, Boolean algebra	Safety Quiz
2	9/2	9/4	W2: Boolean algebra, logic gates, Lab1 (E1: equipment)	**9-1: Holiday**
3	9/9	9/11	W3: Boolean algebra, logic gates, Lab2 (E4: logic gates)	**9-10: Census Day**
4	9/16	9/18	W4: Minterm/maxterm, Lab3 (E7: Boolean laws)	
5	9/23	9/25	W5: K-maps, Multisim Logic Hazard Lab, Lab 2 peer reviews	
6	9/30	10/2	W6: NAND-NOR & combinational circuits, Lab 4 (E8: K-maps)	
7	10/7	10/9	W7: Review	
8	10/14	10/16	W8: Midterm, Lab5 (E9: K-maps)	**Exam**
9	10/21	10/23	W9: Hazard logic, circuit simulation, Lab6 (E12: multiplexors)	
10	10/28	10/30	W10: Latches, Multiplexors, Lab7 (E14: D latch / FF)	
11	11/4	11/6	W11: Latches & flip flops, counters, Lab8 (E18: Counters)	
12	11/11	11/13	W12: Molasses tank Multisim; project kick-off	**Start project**
13	11/18	11/20	W13: FPGAs, project time	
14	11/25	11/27	W14: Project time or review as needed	**Thanksgiving**
15	12/2	12/4	W15: Project presentations, final exam review	**Projects due!**
16			Final:	**Final Exam**
Note: Specific dates are subject to change				

The syllabus/schedule are subject to change

ACCESS AND NAVIGATION

You will need your campus-wide ID (CWID) and password to log into the course. If you do not know your CWID or have forgotten your password, contact the Center for IT Excellence (CITE) at 903.468.6000 or helpdesk@tamuc.edu.

Note: Personal computer and internet connection problems do not excuse the requirement to complete all course work in a timely and satisfactory manner. Each student needs to have a backup method to deal with these inevitable problems. These methods might include the availability of a backup PC at home or work, the temporary use of a computer at a friend's home, the local library, office service companies, Starbucks, a TAMUC campus open computer lab, etc.

COMMUNICATION AND SUPPORT

If you have any questions or are having difficulties with the course material, please contact your Instructor.

Technical Support

If you are having technical difficulty with any part of Brightspace, please contact Brightspace Technical Support at 1-877-325-7778. Other support options can be found here:

https://community.brightspace.com/support/s/contactsupport

Interaction with Instructor Statement

You can ask questions any time before, during, and after lectures or office hours face to face. You can also send an e-mail. Please expect an answer within few hours for e-mails.

COURSE AND UNIVERSITY PROCEDURES/POLICIES

Course Specific Procedures/Policies

ü Late work will not be accepted and a grade of "0" will be assigned, unless prior arrangements are worked out with the instructor. Late penalties will be assessed to any prior-arranged approved late work, 20% off per day.

- A make-up exam/quiz is allowed only if the student informs the instructor before the exam due date and provides a doctor's note with an acceptable health excuse. Family emergencies are not accepted as a reason for make-up exams.

ü Attendance is mandatory. The instructor takes attendance for every class.

Syllabus Change Policy

The syllabus is a guide. Circumstances and events, such as student progress, may make it necessary for the instructor to modify the syllabus during the semester. Any changes made to the syllabus will be announced in advance.

University Specific Procedures

Student Conduct

All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. The Code of Student Conduct is described in detail in the Student Guidebook.
http://www.tamuc.edu/Admissions/oneStopShop/undergraduateAdmissions/studentGuidebook.aspx

Students should also consult the Rules of Netiquette for more information regarding how to interact with students in an online forum: Netiquette
http://www.albion.com/netiquette/corerules.html

ETAMU Attendance
For more information about the attendance policy please visit the Attendance webpage and Procedure 13.99.99.R0.01.
http://www.tamuc.edu/admissions/registrar/generalInformation/attendance.aspx

http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/academic/13.99.99.R0.01.pdf

Academic Integrity
Students at East Texas A&M University are expected to maintain high standards of integrity and honesty in all of their scholastic work. For more details and the definition of academic dishonesty see the following procedures:
East Texas A&M University acknowledges that there are legitimate uses of Artificial Intelligence, ChatBots, or other software that has the capacity to generate text, or suggest replacements for text beyond individual words, as determined by the instructor of the course.

Any use of such software must be documented. Any undocumented use of such software constitutes an instance of academic dishonesty (plagiarism).

Individual instructors may disallow entirely the use of such software for individual assignments or for the entire course. Students should be aware of such requirements and follow their instructors 'guidelines. If no instructions are provided the student should assume that the use of such software is disallowed.

In any case, students are fully responsible for the content of any assignment they submit, regardless of whether they used an AI, in any way. This specifically includes cases in which the AI plagiarized another text or misrepresented sources.

Undergraduate Academic Dishonesty 13.99.99.R0.03

http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/undergraduates/13.99.99.R0.03UndergraduateAcademicDishonesty.pdf

Graduate Student Academic Dishonesty 13.99.99.R0.10

http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/graduate/13.99.99.R0.10GraduateStudentAcademicDishonesty.pdf

Students with Disabilities-- ADA Statement
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. 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 have a disability requiring an accommodation, please contact:

Office of Student Disability Resources and Services
East Texas A&M University
Velma K. Waters Library Rm 162
Phone (903) 886-5150 or (903) 886-5835
Fax (903) 468-8148
Email: studentdisabilityservices@tamuc.edu
Website: Office of Student Disability Resources and Services
http://www.tamuc.edu/campusLife/campusServices/studentDisabilityResourcesAndServices/

Nondiscrimination Notice
East Texas A&M University will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on the basis of race, color, religion, sex, national origin, disability, age, genetic information or veteran status. Further, an environment free from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.

Campus Concealed Carry Statement

Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in East Texas A&M University buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and East Texas A&M University Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations.

For a list of locations, please refer to the Carrying Concealed Handguns On Campus document and/or consult your event organizer.

Web url:
http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/34SafetyOfEmployeesAndStudents/34.06.02.R1.pdf

Pursuant to PC 46.035, the open carrying of handguns is prohibited on East Texas A&M University campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.

East Texas A&M University Supports Students' Mental Health
The Counseling Center at East Texas A&M University located in the Halladay Building, Room 203, offers counseling services, educational programming, and connection to community resources for students. Students have 24/7 access to the Counseling Center's crisis assessment services by calling 903-886-5145. For more information regarding Counseling Center events and confidential services, please visit **www.tamuc.edu/counsel**.