

1. ECE 3160 – Digital Systems Laboratory
2. Course credit hours: 1
Contact hours per week: 3
Credit category: Engineering Topics
3. Course Instructor: Dr. Mohamed Mahmoud
4. Textbook: Digital Design: Principles and Practices, J. F. Wakerly, 4th Edition, Prentice Hall, 2006.

Supplemental materials:
N/A

5. Course information:

Catalog description	Hardware considerations and performance of combinational and sequential digital devices including gates, flip-flops, multiplexers, and decoders.
Prerequisite(s)	C or better in ECE 2011 and C or better in ECE 2110.
Course type	Selected elective for EE, EE-VE; Required for EE-Mech, CmpE

6. Course instructional outcomes:

Course Outcome No.	Course Outcome (CO)	ABET Student Outcome
CO1	Effectively use digital laboratory equipment.	SO5, SO6
CO2	Recognize and avoid many common digital circuit problems.	SO1, SO6
CO3	Measure the electronic and logical characteristics of logic devices.	SO6
CO4	Construct, design and test combinational and sequential logic circuits using appropriate techniques.	SO1, SO2, SO5
CO5	Write technical reports.	SO3

ABET criterion 3 Student Outcomes addressed by this course:

SO No.	Student Outcome (SO)
SO1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
SO2	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.
SO3	An ability to communicate effectively with a range of audiences.

SO5	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
SO6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

7. Course topics:

1. Introduction to digital test equipment and laboratory reports (8%)
2. HC logic family timing: propagation delay and rise/fall times (8%)
3. HC logic family I/O: voltage and current characteristics (8%)
4. HC logic family decoupling, noise margin, and unused input pins (8%)
5. Feedback oscillation problem and LED drivers (8%)
6. Construction and testing of combinational logic circuits (8%)
7. Verification of Boolean algebra and logic minimization techniques (14%)
8. Design and testing of sequential logic (8%)
9. Practical design of combinational logic circuits (14%)
10. Logic implementation using multiplexers and decoders (8%)
11. Techniques for a combinational design project (8%)

Program criteria (curriculum) addressed by this course:

1. ...engineering topics necessary to analyze and design complex electrical and electronic devices, software, and systems containing hardware and software components.
2. ...discrete mathematics.

8. Additional topics, assignments, or requirements for dual-level (4000/5000) course:
N/A

9. Date: 09/19/2023