



**Ahmedabad
University**

Course	ECE209 Digital Design	Semester	Monsoon Semester 2024
Faculty Name(s)		Contact	
School	SEAS	Credits	4
GER Category:		Teaching Pedagogy Enable:NO	P/NP Course: Can not be taken as P/NP
Schedule			
Prerequisite	Not Applicable		
Antirequisite	Not Applicable		
Corequisite	Not Applicable		
Course Description	The course aims to provide an understanding of the fundamentals of designing digital circuits comprising a basic computer system. Students would be introduced to various methods used for designing diverse digital electronic circuits.		
Course Objectives	<ul style="list-style-type: none"> • To introduce fundamentals of digital design • To develop an understanding of the design and implementation of various combinational and sequential circuits • To enable students to design memory and arithmetic circuits 		

Learning Outcomes	<p>At the end of this course, students will be able to:</p> <ul style="list-style-type: none"> - Understand the basics of number systems, Boolean algebra, and standard digital logic gates. - Analyze the functionality of digital combinational-logic circuits (decoder/encoder, MUX/De-MUX, comparators, adders, etc.) and design these combinational-logic circuits. - Comprehend the basics of sequencing elements (latches and flip-flops) and the functioning of digital sequential-logic circuits (registers, counters, FSMs, etc.) - Design varied digital sequential logic circuits.
Pedagogy	Lectures, Laboratory work wherein the learned theoretical concepts would be verified, Project, Quiz, and Assignments
Expectation From Students	Active participation in the classroom and timely submission of assignments.
Assessment/Evaluation	<ul style="list-style-type: none"> • Mid-Semester Examination: <ul style="list-style-type: none"> ◦ Written - 15% • End Semester Examination: <ul style="list-style-type: none"> ◦ Written - 30% • Other Components: <ul style="list-style-type: none"> ◦ Quiz - 10% ◦ Lab Assignment - 10% ◦ Assignment & Class Participation - 10% ◦ Project - 25%
Attendance Policy	As per Ahmedabad University Policy.
Project / Assignment Details	Will be declared in class in due course of time.
Course Material	<p>Other Course Material</p> <ul style="list-style-type: none"> • Digital Fundamentals, By Thomas L. Floyd, Pearson. , • Fundamentals of Digital Logic With Verilog Design, By Stephen Brown, New Delhi Tata Mcgraw-Hill. ,

Additional Information	
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Session Plan

NO.	TOPIC TITLE	TOPIC & SUBTOPIC DETAILS	READINGS,CASES,ETC.	ACTIVITIES	IMPORTANT DATES
1	Introduction to Digital Logic and Number Systems	Digital vs Anaog systems	Powerpoint	Lecture, Pen paper exercise	
2	Introduction to Digital Logic and Number Systems	Data Representation and Coding	Textbook Ch:1	Problem Solving	
3	Introduction to Digital Logic and Number Systems	Basic Logic operations,truth tables and logic gates	Textbook Ch:1	Lecture, Problem solving	
4	Lab-1	Introduction to various tools, techniques to be used for the Laboratory	Powerpoint presentation	Simulation tools Introduction	
5	Lab-1	Introduction to various tools, techniques to be used for the Laboratory	Powerpoint presentation	Simulation tools Introduction	
6	Introduction to Digital Logic and Number Systems	Number systems and Codes	Textbook Ch:1	Lecture, Problem solving	
7	Introduction to Digital Logic and Number Systems	Binary,Octal and Hexadecimal Arithmetic	Textbook Ch:1	Lecture, Problem solving	
8	Lab-2	Introduction to Logic Gates and their simulation	Laboratory Manual	Simulation on the computer	
9	Lab-2	Introduction to Logic Gates and their simulation	Laboratory Manual	Simulation on the computer	

10	Introduction to Digital Logic and Number Systems	Error Detection and Correction Codes	Textbook Ch:2	Lecture, Problem solving	
11	Assignment-1	Problem related to digital number systems	Assignment shared	Pen and Paper exercises	
12	Digital Combinational Logic Circuits	Boolean Algebra and Simplifications of Boolean functions	Textbook Ch:2	Lecture,Reading,Discussions	
13	Digital Combinational Logic Circuits	Standard representations of logic functions	Textbook Ch:2	Discussions, Problem solving	
14	Digital Combinational Logic Circuits	Simplification using Karnaugh-map method	Textbook Ch:3	Lecture, Problem solving	
15	Digital Combinational Logic Circuits	Simplification using Karnaugh-map method	Textbook Ch:3	Lecture, Problem solving	
16	Digital Combinational Logic Circuits	Tabulation method	Textbook Ch:3	Lecture, Problem solving	
17	Lab-3	Experiment based on Different Codes	Laboratory Manual	Performing and verifying in the simulation tool	
18	Lab-3	Experiment based on Different Codes	Laboratory Manual	Performing and verifying in the simulation tool	
19	Midsemester Exam	Topics till midsemester exam	Midsemester Exam	Midsemester Exam	
20	Digital Combinational Logic Circuits	Demultiplexers, Combinational Shifters	Textbook CH:4	Lecture, Problem solving	
21	Lab-4	Experiment based on Combinational Circuits	Laboratory Manual	Performing and verifying in the simulation tool	
22	Lab-4	Experiment based on Combinational Circuits	Laboratory Manual	Performing and verifying in the simulation tool	

23	Digital Combinational Logic Circuits	Code Converter	Textbook Ch:4	Discussions, Problem solving	
24	Digital Combinational Logic Circuits	Basic Multiplier	Textboo Ch:5	Problem Solving	
25	Lab-5	Experment based on Combinational Circuits design	Laboratory Manual	Performing and verifying in the simulation tool	
26	Lab-5	Experment based on Combinational Circuits design	Laboratory Manual	Performing and verifying in the simulation tool	
27	Assignment-2	Probem related to Digital Combinational Logic Circuits	Assignment shared	Solving Shared assignment problems	
28	Digital Sequential Logic Circuits	Basic Sequential Elements:latches and Flip Flops	Textbook Ch:6	Lecture, Problem solving	
29	Lab-6	Experiment based on Basic Latches and Flipflops	Laboratory Manual	Performing and verifying in the simulation tool	
30	Lab-6	Experiment based on Arithematic and Logic Unit design	Laboratory Manual	Performing and verifying in the simulation tool	
31	Digital Sequential Logic Circuits	SR, D,T and JK latch	Textbook Ch:6	Lecture, Problem solving	
32	Digital Sequential Logic Circuits	Flip Flops	Textbook Ch:6	Lecture, Problem solving	
33	Lab-7	Experiment based on Latches and Flip flops	Laboratory Manual	Performing and verifying in the simulation tool	
34	Lab-7	Experiment based on Latches and Flip flops	Laboratory Manual	Performing and verifying in the simulation tool	
35	Digital Sequential Logic Circuits	Synchronous Machines	Textbook Ch:7	Lecture, Problem solving	

36	Digital Sequential Logic Circuits	Registers and their design	Textbook Ch:7	Lecture, Problem solving	
37	Lab-8	Experiment based on Sequential Design	Laboratory Manual	Performing and verifying in the simulation tool	
38	Lab-8	Experiment based on Sequential Design	Laboratory Manual	Performing and verifying in the simulation tool	
39	Digital Sequential Logic Circuits	Counters(synchronous)	Textbook Ch:7	Lecture, Problem solving	
40	Digital Sequential Logic Circuits	Counters(Asynchronous)	Textbook Ch:7	Lecture, Problem solving	
41	Lab-9	Experiment based on Sequential Design	Laboratory Manual	Performing and verifying in the simulation tool	
42	Lab-9	Experiment based on Sequential Design	Laboratory Manual	Performing and verifying in the simulation tool	
43	Assignment-3	Problems related to Sequential Circuits	Problems Shared by Faculty	Pen and Paper exercises	
44	Quiz	Quiz based on combinational and sequential circuits	Quiz	Quiz	
45	Lab-10	Experiment based on Finite State machines	Laboratory Manual	Performing and verifying in the simulation tool	
46	Lab-10	Experiment based on Finite State machines	Laboratory Manual	Performing and verifying in the simulation tool	
47	Introduction to Memory and Programmable logic devices	Programmable Logic Devices	Textbook Ch:8	Lecture, Problem solving	

48	Lab-11	Experiment based on PLD	Laboratory Manual	Performing and verifying in the simulation tool	
49	Lab-11	Experiment based on PLD	Laboratory Manual	Performing and verifying in the simulation tool	
50	Introduction to Memory and Programmable logic devices	Sequential PLDs and Their Applications	Textbook Ch:8	Lecture, Problem solving	
51	Assignment-4	Problems related to Programmable logic devices	Shared Problems	Pen and Paper exercises	
52	Lab-12	Project work	Reading different sources viz. Websites, reading material	Discussions	
53	Lab-12	Floating Project Definitions and Instructions	Reading different sources viz. Websites, reading material	Problem Solving	
54	Project	Floating Solutions and Design	Reading different sources viz. Websites, reading material	Problem Solving	
55	Project	Simulations Results and Discussions	Powerpoint	Presentations of the Project and discussions	
56	Project	Simulations Results and Discussions	Powerpoint	Presentations of the Project and discussions	
57	Reflections and Review	All Chapters	Discussions	Pen and Paper writing	
58	Reflections and Review	All Chapters	Discussions	Pen and Paper writing	
59	Quiet Reading	Self reflections of all the chapters	Reading different sources viz. Websites, reading material	Reading textbooks,reference books	

60	End Semester Exam	End Semester Exam	End Semester Exam	End Semester Exam	
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