Ahmedabad University

Course	CSC201 Computer Organisation	Semester	Monsoon Semester 2024
Faculty Name(s)	Susanta Tewari	Contact	susanta.tewari@ahduni.edu.in
School	SEAS	Credits	3
GER Category:	Not Applicable	Teaching Pedagogy Enable:NO	P/NP Course: Can not be taken as P/NP

Schedule				
Section 1	01:00 pm to 02:30 pm	Mon	01-08-24 to 26-11-24
	01:00 pm to 02:30 pm	Wed	01-08-24 to 26-11-24

Prerequisite	CSE100 Fundamentals of Computer Programming OR ECE209 Digital Design OR ECE209 Digital Design & ECE209 Digital Design
Antirequisite	CSE2XX Computer Organization and Architecture or CSE206 Computer Organization and Architecture
Corequisite	Not Applicable

Course Description	**Overview of Digital Sequential Circuits and its Implementation** Review of digital logic circuits: Sequential circuits (counters and registers) and Moore Finite State Machines (FSM): Various methods of implementation of FSM:Implementation based on Decoders and OR gates, implementation based on two-level Multiplexers, implementation based on ROM. **Introduction to Computer Organization** Basic structure of micro-computer / Central Processing Unit (CPU); Concept of control bus, address bus and data bus. Concept of Instruction Set Architecture. Understanding the building blocks of micro-computer: Data memory, Instruction Memory, Register Set, Address decoding, Arithmetic-logic Unit (ALU), Program Counter (PC), Stack Memory and stack pointers, I/O registers, control unit, etc. Design of control unit: Hardwired Control (MUX based and FSM based), Microprogrammed Control (ROM based). **Instruction set architecture and assembly language programming** RISC and CISC Architectures; Harvard and von Neumann Architectures; Instruction format; Addressing Modes; Instruction Set for an example microprocessor (8085/AVR/MIPS/etc.) covering these category of instructions: Data Transfer; Arithmetic; Logical; Branching; Subroutine; Stack; Basic I/O and Interrupt; Assembly language programming. **Basics of Memory Organization and Pipelining** Introduction to memory hierarchies and organization; Cache; Introduction to Pipelining: Arithmetic Pipeline; Instruction Pipeline;
Course Objectives	The objective of this course is to provide a broad overview of digital logic design and computer organization in a single semester. The emphasis on electrical properties is kept to a bare minimum so that students of Computer Science can understand how a computer really works, without a background in electronic signals and systems.
Learning Outcomes	At the end of this course students will be able to: • Describe the building blocks of the micro-computer, such as: the ALU, registers, control unit, memory and I/O unit, etc. • Identify the basics aspects of pipelining and memory organization. • Organize the blocks of the micro-computer, and create a basic functional architecture. • Write simple programs in assembly language, utilizing the instruction set architecture. • Apply the knowledge of digital logic, to implement some of the building blocks of the micro-computer, especially, control unit, ALU, registers, PC etc.
Pedagogy	
Expectation From Students	

Assessment/Evaluation	- Mid-Semester Examination: - Written - 30% - Other Components: - Assignments and Quizzes - 70%
Attendance Policy	As per Ahmedabad University Policy.
Project / Assignment Details	
Course Material	Other Course Material 1. M. Morris Mano, "Computer System Architecture", Pearson Education 2. Yale N. Patt, Sanjay J. Patel, "Introduction to Computing Systems" McGraw Hill 3. R.S.Gaonkar, "Microprocessor Architecture, Programming and Applications with 8085A", Penram International 4. David A Patterson and John L. Hennessy, "Computer Organization and Design", Morgan Kaufmann Publishers , 1. M. Morris Mano, "Computer System Architecture", Pearson Education 2. Yale N. Patt, Sanjay J. Patel, "Introduction to Computing Systems" McGraw Hill 3. R.S.Gaonkar, "Microprocessor Architecture, Programming and Applications with 8085A", Penram International 4. David A Patterson and John L. Hennessy, "Computer Organization and Design", Morgan Kaufmann Publishers , 1. M. Morris Mano, "Computer System Architecture", Pearson Education 2. Yale N. Patt, Sanjay J. Patel, "Introduction to Computing Systems" McGraw Hill 3. R.S.Gaonkar, "Microprocessor Architecture, Programming and Applications with 8085A", Penram International 4. David A Patterson and John L. Hennessy, "Computer Organization and Design", Morgan Kaufmann Publishers , 1. M. Morris Mano, "Computer System Architecture", Pearson Education 2. Yale N. Patt, Sanjay J. Patel, "Introduction to Computing Systems" McGraw Hill 3. R.S.Gaonkar, "Microprocessor Architecture, Programming and Applications with 8085A", Penram International 4. David A Patterson and John L. Hennessy, "Computer Organization and Design", Morgan Kaufmann Publishers ,
Additional Information	

Session Plan

NO.	TOPIC TITLE	TOPIC & SUBTOPIC DETAILS	READINGS,CASES,ETC.	ACTIVITIES	IMPORTANT DATES
0					
1	Digital design fundamentals	Combinational circuits basics,sequential circuit basics	Textbooks,reference books		
2	Programable devices	Basics of programmable devices	Textbooks,reference books		
3	Programable devices	Basics of programmable devices	Textbooks,reference books		
4	Introduction to Verilog and computers	Verilog language, basics of computers	Textbooks,reference books	Programing competition in class	
5	Introduction to Verilog and computers	Verilog language, basics of computers	Textbooks,reference books	Programing competition in class	
6	Introduction to Verilog and computers	Verilog language, basics of computers	Textbooks,reference books	Programing competition in class	
7	Simple Processor design	Various Architectures,RISC,CISC,ALU design, Hazards	Reference Books, Powerpoint,	where students will suggest their own ideas of defining an architecture	
8	Simple Processor design	Various Architectures,RISC,CISC,ALU design, Hazards	Reference Books, Powerpoint,	where students will suggest their own ideas of defining an architecture	
9	Simple Processor design	Various Architectures,RISC,CISC,ALU design, Hazards	Reference Books, Powerpoint,	where students will suggest their own ideas of defining an architecture	

10	Pipelining	Basics of pipelining, advantages,features,CPI,Speed-up factor,examples	Reference Books, Powerpoint,	
11	Pipelining	Basics of pipelining, advantages,features,CPI,Speed-up factor,examples	Reference Books, Powerpoint,	
12	Pipelined Processor Design	Architecture of a pipelined Processor	Powerpoint,Text books	Students will be designing their own pipelined architectures and come out with various architectures
13	Pipelined Processor Design	Architecture of a pipelined Processor	Powerpoint,Text books	Students will be designing their own pipelined architectures and come out with various architectures
14	Pipelined Processor Design	Architecture of a pipelined Processor	Powerpoint,Text books	Students will be designing their own pipelined architectures and come out with various architectures
15	Pipelined Processor Design	Architecture of a pipelined Processor	Powerpoint,Text books	Students will be designing their own pipelined architectures and come out with various architectures
16	Hazards	Various Hazards Viz. Structural,Data hazards,Control Hazards and their proposed solutions	Text Books,Reference Books,Powerpoint	
17	Hazards	Various Hazards Viz. Structural,Data hazards,Control Hazards and their proposed solutions	Text Books,Reference Books,Powerpoint	

18	Hazards	Various Hazards Viz. Structural,Data hazards,Control Hazards and their proposed solutions	Text Books,Reference Books,Powerpoint		
19	Hazards	Various Hazards Viz. Structural,Data hazards,Control Hazards and their proposed solutions	Text Books,Reference Books,Powerpoint		
20	Memories	Various memories,their classification and examples	Text Books,Reference Books		
21	Memories	Various memories,their classification and examples	Text Books,Reference Books		
22	Memories	Various memories,their classification and examples	Text Books,Reference Books		
23	Memories	Various memories,their classification and examples	Text Books,Reference Books		
24	Multiplier Arithematic	Various multiplier algorithms like booth,modified booth,MCM etc and their examples	Text Books,Reference Books		
25	Multiplier Arithematic	Various multiplier algorithms like booth,modified booth,MCM etc and their examples	Text Books,Reference Books		
26	Multiplier Arithematic	Various multiplier algorithms like booth,modified booth,MCM etc and their examples	Text Books,Reference Books		
27	Multiplier Arithematic	Various multiplier algorithms like booth,modified booth,MCM etc and their examples	Text Books,Reference Books		

| 28 | Implementaion of project | Post route synthesis and implementation over FPGA | | Students will be running post route simulation for the project | |
| 29 | Implementaion of project | Test Cases verification | | Demonstration of the project with test cases | |