বাংলাদেশ আর্মি ইন্টারন্যাশনাল ইউনিভার্সিটি অব সায়েন্স এন্ড টেকনোলজি, কুমিল্লা

BANGLADESH ARMY INTERNATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY (BAIUST), CUMILLA

COURSE OUTLINE

Semester: 1/2024 (Fall)
Course Title: Microprocessor, Assembly Language & Computer Interfacing
Course Code: CSE 325

1. BASIC INFORMATION

Faculty	Syed Shakil Mahmud							
Office Hours	**Day**	**Time**			**Room No.**			
	Monday	10:30 AM - 11:25 AM			310			
	Wednesday	11:35 AM - 12:30 PM			310			
	Wednesday	12:35 PM - 01:30 PM			310			
Counseling Hour	Sunday	02:00 PM – 04:00 PM			Office			
Contact Details	Office:	CSE Faculty Room, 3rd Floor, Academic Block						
	Email:	shakil.cse@baiust.ac.bd						
	Mobile:	01863784974						
Pre-requisites	CSE-223							
Offering Dept.	CSE							
Course Title	Microprocessor, Assembly Language & Computer Interfacing							
Course Code	CSE-325	**Credit**	03	**Contact Minutes**	2310			
Number of Lectures	37	**Number of Tutorials**	04	**Assignment and Presentation**	1	**Total**	42	

2. RATIONALE

The Microprocessor, Assembly Language & Computer Interfacing course equips students with a deep understanding of modern processor architectures, focusing on Intel's 8086 and its internal workings, such as addressing modes and instruction sets. Students will gain practical skills in assembly language programming, essential for low-level hardware control. The course also covers critical topics like interrupt handling and memory management, key for efficient processor operation. Additionally, the inclusion of AVR microcontrollers and embedded system programming introduces students to real-world interfacing and control systems, preparing them for careers in embedded system design and hardware programming.

3. OBJECTIVE

a. To develop a comprehensive understanding of microprocessor architecture
b. To enable students to design and interface hardware components effectively.

4. COURSE DESCRIPTION

1. Architectural overview of Intel Family, Microprocessor and its operation, CMP, Multi-core processor, Many core processor, CISC, RISC;

2. Intel 8086 Microprocessor: Internal architecture, register structure, programming model, addressing modes, instruction set; I/O Pin diagram and Control signals; I/O port organization and accessing; Cache Memory, TLB Structure; Memory Management in Intel 80X86 Family, DMA controller, Co-Processor;

3. Interrupts and Exception in Intel 80X86 families of processors, type of Interrupts, Interrupts in real mode and protected mode, Interrupt descriptor tables, Interrupts Priorities;

4. Introduction to Microcontroller, Atmel AVR microcontroller family: features, Layout, peripherals, Atmega32 Programmer Model: Memory, registers, pin out and descriptions, basic embedded system programming;

5. **LEARNING OUTCOMES & GENERIC SKILLS**

		Bloom's Taxonomy	CP	CA	KP	Assessment Method
CO 1	**Explain** different elements of microprocessor and microcontroller and their characteristics	C1-C2	1	-	1,3,6	T, MT
CO 2	**Demonstrate** the connections between microprocessor, it's peripherals and design 8051 microcontroller based system	C3,C6	1	-	1,3,8	F, ASG
CO 3	**Analyze** the functionality of Atmega32 microcontroller using basic embedded C language.	C4	3	3	3,5,6	PR, T, Q, MT, F
CO 4	Apply knowledge and programming proficiency using various addressing modes and data transfer instructions of the target microprocessor and solve assembly language programs.	C3,C5	1,7	-	3	T, MT
CO 5	Develop communication skills by presenting topics on microprocessors, interfacing and assembly Language.	A2	-	1	-	Pr, Q
(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test ; PR – Project ; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; V - Viva; F – Final Exam; MT – Mid Term)						

6. SKILL MAPPING

No.	Course Learning Outcome	PROGRAM OUTCOMES (PO) (H – High, M- Medium, L-low)											
		1	2	3	4	5	6	7	8	9	10	11	12
CO 1	**Explain** different elements of microprocessor and microcontroller and their characteristics	H											
CO 2	**Demonstrate** the connections between microprocessor, it's peripherals and design 8051 microcontroller based system	H											
CO 3	**Analyze** the functionality of Atmega32 microcontroller using basic embedded C language.		M										
CO 4	Apply knowledge and programming proficiency using various addressing modes and data transfer instructions		M										

	of the target microprocessor and solve assembly language programs.												
CO 5	Develop communication skills by presenting topics on microprocessors, micro-controllers and assembly Language.									L			

7. JUSTIFICATION FOR CO-PO MAPPING:

Mapping	Level	Justification
CO1-PO1	High	**Explain** different elements of microprocessor and microcontroller and their characteristics
CO2-PO1	High	**Demonstrate** the connections between microprocessor, it's peripherals and design 8051 microcontroller based system
CO3-PO2	Medium	**Analyze** the functionality of Atmega32 microcontroller using basic embedded C language.
CO4-PO2	Medium	Apply knowledge and programming proficiency using various addressing modes and data transfer instructions of the target microprocessor and solve assembly language programs.
CO5-PO10	Low	Develop communication skills by presenting topics on microprocessors, micro-controllers and assembly Language.

8. TEACHING LEARNING STRATEGY

Teaching and Learning Activities	Engagement (hours)
Face-to-Face Learning	
Lecture	42
Practical / Tutorial / Studio	-
Student-Centered Learning	-
Self-Directed Learning	
Non-face-to-face	42
learningRevision	21
Assessment Preparations	21
Formal Assessment	
Continuous	2
AssessmentFinal	3
Examination	
Total	131

9. LECTURE OUTLINE

Class	Topics/Assignment	COs	Reading Reference	Lecture Outcomes/ Activities
1	Architectural overview of Intel Family	1	1	Describe about different Processors of Intel Family
2	Microprocessor and its operation	1	1	Name different parts of Microprocessor

3	CMP, Multi-core processor, Many core processor , CISC, RISC	1	1	Identify processor organization
4	Intel 8086 Microprocessor: Internal architecture	1	1	Explain various parts of 8086 and their relations
5	Intel 8086 Microprocessor: register structure	1	1	Explain various registers of 8086
6	Intel 8086 Microprocessor: programming model	1	1	Identify programming model of 8086
7	Intel 8086 Microprocessor : addressing modes	1	1	Differentiate 8086 memory addressing modes
8	Review	1	1	Lecture 1-7
9	Class Test 1	1	1	Lecture 1-7
10	Intel 8086 Microprocessor: I/O Pin diagram and Control signals- Part-I	1	1	Describe 8086 pin diagram
11	Intel 8086 Microprocessor: I/O Pin diagram and Control signals- Part-II	1	1	Describe 8086 pin diagram
12	Intel 8086 Microprocessor: I/O Pin diagram and Control signals- Part-III	1	1	Describe 8086 pin diagram
13	Type of Interrupts, Interrupts in real mode and protected mode, Interrupt descriptor tables	2,6	1,2	Identify interrupts type, mode
14	Interrupts Priorities -Part I	2	1,2	Describe priorities of interrupt and their application
15	Interrupts Priorities -Part I	2	1,2	Describe priorities of interrupt and their application
16	Interrupts Priorities -Part II	2	1,2	Describe priorities of interrupt and their application
17	Interrupts Priorities -Part III	2	1,2	Describe priorities of interrupt and their application
18	Review			Lecture 10 – 18
19	Class Test 02			Lecture 10 – 18
20	Introduction to Microcontroller	3	1	Explain different basic elements of Microcontroller
21	Atmel AVR microcontroller family: features, Layout, peripherals	3	1	Identify AVR microcontroller family and their characteristics
22	Atmega32 Programmer Model: Memory, registers	3	1	Explain Atmega32 and its functionality
23	Atmega32 Programmer Model: pin out and descriptions Part-I	3	1	Explain Atmega32 and its functionality
24	Atmega32 Programmer Model: pin out and descriptions Part-II	3		Explain Atmega32 and its functionality
25	Basic embedded system programming: Introduction to Embedded C language. Part-I	3	1	Analyze functionality of Atmega32 using embedded C language
26	Embedded C language Part-II	3	3	Analyze functionality of Atmega32 using embedded C language
27	Review class			Lecture 21 – 32
28	Class Test 03			Lecture 21 – 32
29	Assembly programming basics, Arithmetic & Logical processing in Assembly Language	4		Basics of assembly syntax (instructions, operands, registers),

				implementing simple mathematical operations in assembly language
30	Control Flow and Branching in Assembly Language	4		implementing loops and conditionals using assembly language
31	Data Transfer/Movement Instructions	4		PUSH/POP, Load effective address (LEA, LDS, LES), String data transfer (LODS, STOS, MOVS), XCHG, XLAT, IN and OUT.
32	Assembly Addressing modes, Assembly instruction types and their formats:	4		Immediate, Direct, Register, Indirect, Indexed, Base+Offset addressing modes and Examples of addressing modes in Intel 8086
33	Interfacing Basics	2		Why we need interfacing
34	Intel 8086 Interfacing with 8255 PPI	2		Architecture, Working, Modes
35	Programmable Interval Timer 8254	2		Architecture, Working, Modes
36	Intel 8086 Interfacing with 8259 PIC and Other ICs	2		Architecture, Working, Modes
37	Intel 8257 (Programmable DMA Controller)	2		Architecture, Working, Modes
38	Intel 8086 Interfacing with ADC0804	2,6		Why A/D conversion? About ADC0804, Interfacing ADC0804 with 8086, Interfacing ADC0804 with 8086 using 8255
39	Microcontrollers: Architecture of 8051, memory organization, I/O ports, Special function registers.	2,6		Architecture of 8051(Block diagram, Pin diagram), Types of memory, I/O ports, importance of Special function registers
40	Review class			Lecture 30-39
41	Class Test - 04			Lecture 30-39
42	Review Class, Problem Solutions and Suggestion			Lecture 1 – 41

10. READING REFERENCE

1. The Intel Microprocessors-Barry B. Brey.
2. Microprocessors and Interfacing- Douglas V HALL.
3. The AVR microcontroller and embedded system using assembly and CMuhammad Ali Mazidi.

11. ASSESSMENT STRATEGY

Components		Grading	CO	Blooms Taxonomy
Continuous Assessment (50%)	Test 1-3	10%	CO1, CO3	C1,C2, C4
			CO4	C3, C5
	Class Participation	5%	CO5	A2
	Assignment	5%	CO2	C6
	Mid term	30%	CO1, CO3, CO4	C2
Final Exam		50%	CO1-CO5	C2
				C2
				C4, C6
Total Marks		100%		
(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)				