AMERICAN INTERNATIONAL UNIVERSITY-BANGLADESH (AIUB)

Faculty of Science and Technology (FST)
Department of Computer Science (CS)
Undergraduate Program

COURSE PLAN

Fall 2020-2021 SEMESTER

I. Course Core and Title

COE 3205: Computer Organization & Architecture

II. Credit

3 credit hours (2h theory& 3h Lab per week)

III. Nature

Core Course for CSE

IV. Prerequisite

COE 3104: Microprocessor & EmbeddedSystems

V. Vision:
Our vision is to be the preeminent Department of Computer Science through creating recognized professionals who will provide innovative solutions by leveraging contemporary research methods and development techniques of computing that is in line with the national and global context.

VI. Mission:
The mission of the Department of Computer Science of AIUB is to educate students in a student-centric dynamic learning environment; to provide advanced facilities for conducting innovative research and development to meet the challenges of the modern era of computing, and to motivate them towards a life-long learning process.

VII - Course Description:

- Explain the components of a Microcomputer System
- Describe the organization of the Intel 8086 family of Microprocessors
- Introduce IBM PC Assembly Language
- Learn to use Emulator and to realize their necessity
- Understand how Flag Registers work
- Solve complex programming problems using assembly language

VIII – Course outcomes (CO) Matrix:

By the end of this course, students should be able to:

CO*	CO DESCRIPTION	Level of Domain**			PO Assessed***
		C	P	A	
CO1	*Calculate* flag register values by using the knowledge of binary number systems.		3		1.1
CO2	*Explain* the different aspects of internal organization of 8086 architecture.	2			2.1
CO3	*Demonstrate* assembly language programs using Emulator.		3		5.1

C: Cognitive; P: Psychomotor; A: Affective
** CO assessment method and rubric of COs assessment is provided in Appendix section*
***The numbers under the 'Level of Domain' columns represent the level of Bloom's Taxonomy each CO corresponds to.*
**** The numbers under the 'PO Assessed' column represent the PO (appendix) each CO corresponds to.*

IX – Topics to be covered in Theory and Lab class*:

TOPICS	Specific Objective(s)	Time Frame	Suggested Activities	Teaching Strategy(s)	CO mapped
Introduction: Computer Evolution and the Components of a Microcomputer System Representation of Numbers and Characters in computer Organization of the IBM Personal Computer	➢ A Brief History of computers, Designing for Performance, Von Neumann Architecture, Hardware architecture, Computer Components, Interconnection Structures, Bus Interconnection, Scalar Data Types, Booths Algorithm, Hardware Implementation, Division, Restoring and Non Restoring algorithms, IEEE standards (self-study) ➢ Number systems (Decimal, Binary and Hexadecimal number systems, number system conversions (self-study), ➢ negative number representation	**Week 1**	Theory class	Class Discussion, Slides may be provided	CO2
	➢ I/0 Devices and programming Languages ➢ The Intel 8086 Family of Microprocessors, Organization of the 8086/8088 Microprocessors, Registers, Flags Register, Organization of the PC, The Operating System, Memory Organization of		Lab class	Class Discussion, Slides may be provided	CO2

	the PC, I/0 Port Addresses, Start-up Operation, program segments ➢ Introduction to EMU 8086				
Introduction to IBM PC Assembly Language	➢ Creating, assembling, and executing assembly language program. ➢ Assembly Language syntax basics, Program Data, Variables, assembly instructions, translation of high-level language to assembly language, ➢ Program Structure Input and Output Instructions	**Week 2**	Theory class **Quiz-1**	Class Discussion, Self Study and Assignments	CO3
	➢ Assembly Programming using EMU 8086		Lab Class	Lab Task, assignments	CO3
The Processor Status and the FLAGS register	➢ The FLAGS Registers, The Status Flags, Data Overflow and Overflow flag, effects of instruction in flags, Debugging process, examining programs step by step	**Week 3**	Theory class	Class Discussion, Self Study and Assignments	CO1
	➢ Assembly Programming using EMU 8086		Lab Class	Lab Task, assignments	CO3

Flow Control Instructions	➢ Decision making and repeating statement, ➢ Jump and loop instructions, conditional and unconditional jumps, Algorithm conversion to assembly language, Branching structures and looping structures, high-Level Language Structures	**Week 4**	Theory class, **QUIZ 2**	Class Discussion, Self Study and Assignments	CO3
	➢ Assembly Programming using EMU 8086		Lab Class	Lab Task, assignments	CO3
Flow Control Instructions Logic, Shift and Rotate Instructions	➢ Branching structures and looping structures, high-Level Language Structures ➢ Logic instructions AND, OR, and XOR instruction, not instruction, test instruction, Bit Shifting, Left Shift Instructions , Right Shift Instructions,	**Week 5**	Theory class,	Class Discussion, Self Study and Assignments	CO3
	➢ Assembly Programming using EMU 8086		Lab Class	Lab Task, assignments	CO3
Logic, Shift and Rotate Instructions	➢ Rotate Instructions, Binary and Hex I/O, Rotate instructions, Left and Right rotation, Related exercises	**Week 6**	Theory class, **QUIZ 3**	Class Discussion, Self Study and Assignments	CO3
	➢ Lab Mid-term exam		Lab class	Lab Mid-term exam	CO3
Midterm Week Week 7					

The Stack and Introduction to Procedures	➢ The Stack, A Stack Application, Terminology of Procedures , CALL and RET in procedure,	**Week 8**	Theory class		CO3
	➢ Assembly Programming using EMU 8086		Lab Class		CO3
Multiplication and Division Instructions	MUL and IMUL, Simple Application of MUL and IMUL, DIV and IDIV, Sign Extension of the Dividend	**Week 9**	Theory class		CO3
	➢ Assembly Programming using EMU 8086		Lab Class, **Quiz 1**		CO3
Arrays and Addressing Modes	One Dimensional Arrays , Addressing Modes, Register Indirect Mode, Based and index addressing Modes, An Application: Sorting an Array, 2D arrays, Based indexed addressing mode, A sample application using array, the XLAT instruction and topics related exercises	**Week 10-11**	Theory class,		CO3
	➢ Assembly Programming using EMU 8086		Lab Class, **Quiz 2**		CO3
The String Instructions	Direction Flag, Moving a string, Store string, Load string, Scan string, Compare string		Theory class,		CO3
	➢ Assembly Programming using EMU 8086	**Week 12**	Lab Class		CO3
	Review before final exam		Theory class, **Quiz 3**		CO3
	Lab Final Exam	**Week 13**	Lab Final exam		CO3
Final term Week Week 14					

* The faculty reserves the right to change, amend, add or delete any of the contents.

X- Course Requirements

At least **80% class attendance** is necessary to sit for the exam. If there is any assignment given to the students, they have to submit it before the deadline decided by the course teacher.

XI – Evaluation&Grading System

The following grading system will be strictly followed in this class

Marking system for Mid term		**Marking system for Final term**	
Quiz	20%	Quiz	20%
Attendance	10%	Attendance	10%
Lab performance	20%	Lab performance	20%
Lab quiz	10%	Assignment	10%
Midterm/Final term exam	40%	Midterm/Final term exam	40%
Total	100%	**Total**	100%

Grand Total = 40% of Midterm + 60% of Final Term

The evaluation system will be strictly followed as par the AIUB grading policy.

Letter	Grade Point	Numerical %
A+	4.00	90-100
A	3.75	85-89.99
B+	3.50	80-84.99
B	3.25	75-79.99
C+	3.00	70-74.99
C	2.75	65-69.99
D+	2.50	60-65.99
D	2.25	50-59.99
F	0.00	<50(Failed)

XII – Teaching Methods

Maximum topics will be covered from the textbook. For the rest of the topics, reference books will be followed. Some Class notes will be uploaded on the web. White board will be used for most of the time. For some cases, multimedia projector will be used for the convenience of the students.Students must study up to the last lecture before coming to the class and it is suggested that they should go through the relevant chapter before coming to the class. Just being present in the class is not enough- students must participate in classroom discussions.

XIII – Textbook/ References

1) Assembly Language Programming and Organization of the IBM PC, Ytha Yu and **Charles Marut**, McGraw Hill, 1992. (ISBN: 0-07-072692-2).
2) Essentials of Computer Organization and Architecture, (Third Edition), Linda Null and Julia Lobur
3) W. Stallings, "Computer Organization and Architecture: Designing for performance", 10th Edition, Prentice Hall of India, 2003, ISBN 81 – 203 – 2962 – 7
4) Computer Organization and Architecture by John P. Haynes.

XIV - List of Faculties Teaching the Course

MD. MANZURUL HASAN
1505-1607-2
RAIHAN UDDIN AHMED
1090-1996-2
JUENA AHMED NOSHIN
1605-1711-2

XV – Verification:

Prepared by : --- **Juena Ahmed Noshin** *Course Convener* Date:.....	**Moderated by :** --- **Mahmudul Hasan** *Point Of Contact* *OBE Implementation Committee for CS* Date:.....	
Checked by: ..... **Dr. Md. Mahbub Chowdhury Mishu** *Head*, *Department of Computer Science* Date:.....	**Certified by:** ..... **Dr. Dip Nandi** *Director*, *Faculty of Science &Technology* Date:.....	**Approved by:** ..... **Mr. Mashiour Rahman** *Associate Dean*, *Faculty of Science &Technology* Date:.....

APPENDIX

Program Outcomes (POs):

PO1	**Engineering Knowledge**
1.1	Apply the knowledge of mathematics, science, engineering fundamentals to the solution of complex engineering problems.
1.2	Apply the knowledge of an engineering specialization to the solution of complex engineering problems
PO3	**Design/Development of solution**
3.1	Design solution for complex engineering problems
3.2	Design system components or processes that meet the specified needs with appropriate consideration for public health and safety and of cultural, societal and environmental concerns
PO5	**Modern tool usage**
5.1	Create, select and apply appropriate techniques, resources and modern engineering and IT tools
5.2	Apply the above through prediction and modeling, to complex engineering activities with an understanding of their limitations.

Mapping of CO Assessment Method and Rubric

The mapping between Course Outcome(s) (COs) and The Selected Assessment method(s) and the mapping between Assessment method(s) and Evaluation Rubric(s) is shown below:

CO	Description	Learning Domain	Assessment Method	Assessment Rubric
CO1	*Calculate* flag register values by using the knowledge of binary number system.	Psychomotor	Assignment	Rubric for Assignment part 1
CO2	*Explain* the different aspects of internal organization of 8086 architecture.	Cognitive	Assignment	Rubric for Assignment part 2
CO3	*Demonstrate* assembly language programs using Emulator.	Psychomotor	Assignment	Rubric for Assignment part 3

Rubric for Assignment part 1 Assessment (CO1)

Criteria	Marks distribution (Max 5X3 = 15)				Acquired Marks
	Inadequate (1)	Satisfactory (2)	Good (3)	Excellent (4)	
Presentation	• No name, date, or assignment title included • Disorganized and messy	• Includes name, date, and assignment title. • Fairly organized work.	• Includes name, date, and assignment title. • Organized work.	• Includes name, date, and assignment title. • Creatively organized work.	
Correctness	• Not correct	• Partially Correct	• Fairly Correct	• Correct	
Logical Argument	• No logical arguments / explanation supporting the definition.	• Offers lossy related arguments.	• Strong argument / explanation offered.	• Comprehensive argument presented to clarify the concept.	
				Acquired Marks:	
				CO Pass/Fail:	

Rubric for Assignment part 2 Assessment (CO2)

Criteria	Marks distribution (Max 5X3 = 15)				Acquired Marks
	Inadequate (1)	Satisfactory (2)	Good (3)	Excellent (4)	
Delivery	• Completed less than 70% of the requirements. • Not delivered on time or not in correct format (VUES, email, hardcopy etc.).	• Completed between 70-80% of the requirements. • Delivered on time, and in correct format (VUES, email, hardcopy etc.)	• Completed between 80-90% of the requirements. • Delivered on time, and in correct format (VUES, email, hardcopy etc.)	• Completed between 90-100% of the requirements. • Delivered on time, and in correct format (VUES, email, hardcopy etc.)	
Presentation	• No name, date, or assignment title included • Disorganized and messy	• Includes name, date, and assignment title. • Fairly organized work.	• Includes name, date, and assignment title. • Organized work.	• Includes name, date, and assignment title. • Creatively organized work.	
Correctness	• Not correct	• Partially Correct	• Fairly Correct	• Correct	
				Acquired Marks:	
				CO Pass/Fail:	

Rubric for Assignment part 3 Assessment (CO3)

Criteria	Marks distribution (Max 5X3 = 15)				Acquired Marks
	Inadequate (1)	Satisfactory (2)	Good (3)	Excellent (4)	
Correctness	• Not correct	• Partially Correct	• Fairly Correct	• Correct	
Efficiency	• An inefficient solution.	• Not the most efficient solution	• Solution is efficient	• Solution is very efficient	
Tool Use	• Cannot use tool	• Can use tool but not efficiently	• Can use tool but fairy efficiently	• Can use tool efficiently	
				Acquired Marks:	
				CO Pass/Fail:	