Green University of Bangladesh
Department of Computer Science and Engineering

Course Outline

1 General Information

Fall 2024 CSE 303

Faculty	Faculty of Science and Engineering (FSE)
Department	Department of Computer Science and Engineering (CSE)
Programme	Bachelor of Science in Computer Science and Engineering
Semester	**Fall 2024**
Course Title	*Microprocessors and Microcontrollers*
Course Code	CSE 303
Course Credit	3.00 units
Contact Hours	2.5 hours/week
Course Status	Core Course
Prerequisite Course	None

2 Course Instructors

Section	Name	Office	Email
222_D4	Mozdaher Abdul Quader	A-510	quader@cse.green.edu.bd
222_D6	Mozdaher Abdul Quader	A-510	quader@cse.green.edu.bd
223_D1	Wahia Tasnim	A-608	wahia@cse.green.edu.bd
223_D2	Wahia Tasnim	A-608	wahia@cse.green.edu.bd
223_D3	Wahia Tasnim	A-608	wahia@cse.green.edu.bd
222 D7	Fatema Akter	A-510	$fatema_akter@cse.green.edu.bd$
222 D2	Farjana Akter Jui	A-608	jui@cse.green.edu.bd
223D4	Farjana Akter Jui	A-608	jui@cse.green.edu.bd
222_D5	Md. Nazmus Shakib	A 608	nazmus_shakib@cse.green.edu.bd
222_D3	Md. Nazmus Shakib	A 608	nazmus_shakib@cse.green.edu.bd
222_D10	Sagufta Sabah Nakshi	A 608	sagufta@cse.green.edu.bd
222_D9	Sagufta Sabah Nakshi	A 608	sagufta@cse.green.edu.bd

3 Class Hours

Section	Room	Weekday	Time	Weekday	Time
222_D4	A606	Wednesday	08:30 AM - 09:45 AM	Thursday	08:30 AM - 09:45 AM
222_D6	K111	Monday	03:15 PM - 04:30 PM	Wednesday	03:15 PM - 04:30 PM
223_D1	A602	Monday	09:45:AM - 11:00:AM	Monday	09:45:AM - 11:00:AM
223_D2	A606	Monday	08:30 AM - 09:45 AM	Monday	08:30 AM - 09:45 AM
223_D3	J109	Thursday	09:45:AM - 11:00:AM	Friday	09:15:AM - 10:30:AM
222 D7	A-602	Saturday	11:00:AM - 12:15:AM	Friday	11:00:AM - 12:15:AM
222 D2	K-104	J-109	Wednesday	12:15-1:30 PM	Friday
223D4	K-108	J-109	Tuesday	2:00 - 3:15 PM	Thursday

222_D5	K-104	Monday	03:15 PM - 04:30 PM	Tuesday	03:15 PM - 04:30 PM
222_D3	A-606	Thursday	12:15-1:30 PM	Friday	11.45 AM - 1.00 PM
222_D10	A-606	Thursday	08:30 AM - 09:45 AM	Friday	8:00 AM- 9:15 AM
222_D9	A-603	Friday	09:15 AM - 10:30 AM	Saturday	9:45 AM -11:00 AM

4 Counseling Hours

Section	Weekday	Time	Weekday	Time
222_D4	Wednesday	11:00 AM - 12:00 PM	Wednesday	12:00 PM - 01:00 PM
222_D6	Wednesday	11:00 AM - 12:00 PM	Wednesday	12:00 PM - 01:00 PM
223_D1	Wednesday	11:00 AM - 12:00 PM	Wednesday	12:00 PM - 01:00 PM
223_D2	Wednesday	11:00 AM - 12:00 PM	Wednesday	12:00 PM - 01:00 PM
223_D3	Wednesday	11:00 AM - 12:00 PM	Wednesday	12:00 PM - 01:00 PM
222 D7	Tuesday	11:00 AM - 12:00 PM	Wednesday	11:00 AM - 12:00 PM
222 D2	12:15-1:30 PM	Friday	11:00:AM - 12:15:PM	Monday
223D4	2:00 - 3:15 PM	Wednesday	10:10-11:00 AM	Monday
222_D5	Monday	12:15-1:30 PM	Wednesday	12:15-1:30 PM
222_D3	Monday	12:15-1:30 PM	Wednesday	12:15-1:30 PM
222_D10	Friday	10:30 AM - 11:45 AM	Wednesday	12:15 PM-1:30 PM
222_D9	Friday	11:45 AM - 1:00 PM	Saturday	12:15 PM-1:30 PM

5 Course Rationale

The purpose of this course is to teach students the fundamentals of microprocessor and microcontroller systems. The student will be able to incorporate these concepts into their electronic designs for other courses where control can be achieved via a microprocessor/controller implementation. Microprocessor is the course used to provide an understanding of microprocessor hardware and software. Students completing this course will work with microprocessor-based equipment, and be capable of distinguishing hardware from software faults. The superior students will also be capable of participating in product development efforts, including support and development of assembly language code.

6 Course Description

Microprocessor: Microcontroller & Microcomputer, evaluation of microprocessor & applications, Introduction to 8-bit, 16-bit, and 32-bit microprocessors; Addressing modes: absolute addressing; 8086 internal architecture, PIN diagram of 8086, Max-Min mode, register structure; memory read write cycle; Instruction set; Pipeline concept: interrupts, programmed I/O, memory mapped I/O, interrupt driven I/O, direct memory access; block transfer; cycle stealing; interleaved; multi-tasking and virtual memory; memory interface; bus interface; Arithmetic coprocessor; assembly language programming of 8086 microprocessors.

7 Teaching Methods

Maximum topics will be covered from the Lecture Slides & Textbook. For the rest of the topics, reference books will be followed. Some class notes will be uploaded on the web. White boards will be used for most of the time. For some cases, multimedia projector will be used for the convenience of the students. Students must participate in classroom discussions for case studies, assignments, presentations and small group works.

8 Course Outcomes

CO	CO Description	PO	Domain (LoBT)	Weight	WK	WP	EA	Assessment Methods
CO1	Classify accepted standards and guidelines to select appropriate Microprocessor and Microcontroller to meet specified performance requirements	PO1	Cognitive (C3)	50%	WK3			Please refer to Section 9.
CO2	Illustrate an electrical circuitry design to facilitate seamless interfacing of the Microprocessor I/O ports with external devices.	PO2	Cognitive (C4)	35%	WK4			
CO3	Demonstrate appropriate computing solution for processor or controller using the relevant processor and controller-based application design process.	PO5	Psychomotor (P6)	15%	WK6			

Legend:
CO: *Course Outcome* **PO**: *Program Outcome* (Appendix: A)
WK: *Knowledge Profile* (Appendix: B) **WP**: *Complex Problem Solving* (Appendix: C)
EA: *Complex Engineering Activities* (Appendix: D) **LoBT**: *Level of Bloom's Taxonomy* (Appendix: E)

9 Assessment Methods of COs

Assessment Method	CO1	CO2	CO3	Total
Final Exam	20%	20%		40%
Midterm Exam	20%	10%		30%
Class Tests	10%			10%
K/S/A Test 1 (Group Presentation + Attendance)		5%	5%	10%
K/S/A Test 2 (Class Note)			10%	10%
Total	50%	35%	15%	100%

10 Topic Outline

Lecture	Selected Topic	Article	Problems
1-2	Microcontroller and microcomputer, evaluation of microprocessor and application	T 1.2, 1.5, 1.6, 1.8, 1.10, 1.12	T Exercise Problem
3-5	Introduction to 8-bit Microprocessor 8085, Architecture, Memory interfacing	T 2.1, 2.2, 2.3, 2.4	T Exercise Problem
6-8	Addressing modes, Instruction set	T 2.15. 2.5; 3.4, 3.5	T Exercise Problem
9-11	Stack and Subroutines, Introduction to 8086 Microprocessor.	T 2.7, 2.8; 5.1	T Exercise Problem

12-15	Architecture of Microprocessor 8086, Min Max Mode, Register structure , 8086 Pipeline concepts.	T 2.1, 2.2, 2.3, 2.4 (R2)	T Exercise Problems
16-17	Microprocessor 8086 interrupts	T 2.11, 2.12	T Exercise Problem
18-20	Programmed I/O, memory mapped I/O, interrupt driven I/O, direct memory access	T 9.2, 9.3, 9.8, 9.46	T Exercise Problem
21-23	Introduction to Microcontroller, Internal Architecture of 8051, Pin Diagram of 8051	T 7.1, 7.2, 7.3, 7.4 (R2)	T Exercise Problem
24-25	Microcontroller 8051 Timers and counters, Microcontroller 8051 Memory Interfacing	T 7.6, 9.1 (R2); Ch-13 (R2)	T Exercise Problem
26-27	Microcontroller 8051 Interrupts; Arithmetic co processor	T 7.8 (R2); 10.3 (R1)	T Exercise Problem
28-30	Assembly language programming of 8086 microprocessors	T 3.9, 3.11, 3.17	T Exercise Problem

For the definitions of T and R , Please refer to Section 11.

11 Text and Reference Materials

T Textbook:

- *Douglas V Hall*, **Microprocessors and Interfacing: Programming and Hardware**, Third Edition, McGraw-Hill, 2020.

R References:

- *Barry B. Brey*, **The Intel Microprocessors**, Eight Edition, Prentice Hall, 2009.
- *Godse*, **Microprocessor and Microcontroller System**, First Edition, Technical Publications, 2008.

12 Grading Policy

Marks Obtained	Letter Grade	Numerical Evaluation	Definition
80% and above	A+	4.00	Excellent
75% <80%	A	3.75	Excellent
70% <75%	A-	3.50	Very Good
65% <70%	B+	3.25	Good
60% <65%	B	3.00	Good
55% <60%	B-	2.75	Good
50% <55%	C+	2.50	Average
45% <50%	C	2.25	Average
40% <45%	D	2.00	Below Average
below 40%	F	0.00	Failing

13 Additional Course Policies

1. **Equipment and Aids**: Bring your own materials such as a calculator, notebook, and pen to participate effectively in classroom activities. You are NOT allowed to borrow from others inside the classroom which may potentially create distractions for your classmates.
2. **Assignments**: There will be a number of assignments for formative assessment purposes. The average of the assignment marks will be used for computing the final grade. Late submission of homework will carry a zero mark.

3. **Class Tests**: There will be at least three Class Tests taken during the semester and the best two will be counted for final grading. A class test can be taken with/without prior announcement.

4. **Examinations**: The midterm and final examinations will be a closed book, closed notes. Mobile phones are strictly prohibited in the exam hall. Please bring your own watch (non-smart) and synchronize at the beginning of the examination.

5. **Test Policy**: In case of missing a test without prior notice to the respected faculty member, a zero mark will be given. No makeup tests will be taken as the best two test scores will be considered for grading out of three tests.

6. **Mobile Devices Policy**: Empirical evidence of using multitasking devices such as laptops and smartphones in the classroom hinders the learning experience. Thus, the use of multitasking devices is strictly discouraged. Switch off your laptop/mobile devices during class activities.

14 Additional Information

Please click or scan:

Academic Calendar Fall , 2024:

Academic Information and Policies:

Proctorial Rules:

Grading and Performance Evaluation:

Wahia Tasnim
Course Coordinator, CSE 303
August 30, 2024

Dr. Muhammad Aminur Rahaman
Chairman, Department of CSE
August 30, 2024

Appendix A : Program Outcomes

POs	Category	Program Outcomes
PO1	Engineering Knowledge	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO2	Problem Analysis	Identify, formulate, research the literature and analyze complex engineering problems and reach substantiated conclusions using first principles of mathematics, the natural sciences and the engineering sciences.
PO3	Design/Development of Solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety as well as cultural, societal and environmental concerns.
PO4	Investigations	Conduct investigations of complex problems, considering design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.
PO5	Modern tool usage	Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PO7	Environment and sustainability	Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics	Apply ethical principles and commit to professional ethics, responsibilities and the norms of the engineering practice.
PO9	Individual work and teamwork	Function effectively as an individual and as a member or leader of diverse teams as well as in multidisciplinary settings.
PO10	Communication	Communicate effectively about complex engineering activities with the engineering community and with society at large. Be able to comprehend and write effective reports, design documentation, make effective presentations and give and receive clear instructions.
PO11	Project management and finance	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work as a member or a leader of a team to manage projects in multidisciplinary environments.
PO12	Life Long Learning	Recognize the need for and have the preparation and ability to engage in independent, life-long learning in the broadest context of technological change.

Appendix B : Knowledge Profile

Knowledge Profile	Attribute
WK1	A systematic, theory-based understanding of the natural sciences applicable to the discipline
WK2	Conceptually based mathematics, numerical analysis, statistics and the formal aspects of computer and information science to support analysis and modeling applicable to the discipline
WK3	A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline
WK4	Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline
WK5	Knowledge that supports engineering design in a practice area
WK6	Knowledge of engineering practice (technology) in the practice areas in the engineering discipline
WK7	Comprehension of the role of engineering in society and identified issues in engineering practice in the discipline: ethics and the engineer's professional responsibility to public safety; the impacts of engineering activity; economic, social, cultural, environmental and sustainability

WK8	Engagement with selected knowledge in the research literature of the discipline

Appendix C : Range of Complex Engineering Problem Solving

Attribute	Identity	Complex Engineering Problem Description
Depth of knowledge required	WP1	Cannot be resolved without in-depth engineering knowledge at the level of one or more of K3, K4, K5, K6 or K8 which allows a fundamentals-based, first principles analytical approach
Range of conflicting requirements	WP2	Involve wide-ranging or conflicting technical, engineering and other issues
Depth of analysis required	WP3	Have no obvious solution and require abstract thinking, originality in analysis to formulate suitable models
Familiarity of issues	WP4	Involve infrequently encountered issues
Extent of applicable codes	WP5	Are outside problems encompassed by standards and codes of practice for professional engineering
Extent of stakeholder involvement and conflicting requirements	WP6	Involve diverse groups of stakeholders with widely varying needs
Interdependence	WP7	Are high-level problems including many component parts or sub-problems

Note: Complex Engineering Problems have identity P1 and some or all of P2 to P7.

Appendix D : Range of Complex Engineering Activities

Attribute	Identity	Activity Description
Range of resources	EA1	Involve the use of diverse resources (and for this purpose resources include people, money, equipment, materials, information and technologies)
Level of interaction	EA2	Require resolution of significant problems arising from interactions between wide-ranging or conflicting technical, engineering or other issues
Innovation	EA3	Involve creative use of engineering principles and researchbased knowledge in novel ways
Consequences for society and the environment	EA4	Have significant consequences in a range of contexts, characterized by difficulty of prediction and mitigation
Familiarity	EA5	Can extend beyond previous experiences by applying principles-based approaches

Note: Complex activities means (engineering) activities or projects that have some or all of the above activities.

Appendix E : Domain and Level of Bloom's Taxonomy

Cognitive Domain		Psychomotor Domain		Affective Domain	
C1	Remembering	P1	Perception	A1	Receive
C2	Understanding	P2	Set	A2	Respond
C3	Applying	P3	Guided Response	A3	Value
C4	Analyzing	P4	Mechanism	A4	Organize
C5	Evaluating	P5	Complex Overt Response	A5	Internalize
C6	Creating/ Designing	P6	Adaption		
		P7	Origination		