UNITED INTERNATIONAL UNIVERSITY

Department of Computer Science and Engineering (CSE)

Course Syllabus

1	**Course Title**	Microprocessors and Microcontrollers Laboratory
2	**Course Code**	CSE 4326
3	**Trimester and Year**	Fall, 2024
4	**Pre-requisites**	N/A
5	**Credit Hours**	1.0
6	**Section**	F
7	**Class Hours**	**Wed:** 11:11 AM - 01:40 PM
8	**Classroom**	505
9	**Instructor's Name**	Shekh. Md. Saifur Rahman
10	**Email**	saifur@cse.uiu.ac.bd
11	**Office**	837
12	**Counseling Hours**	

Day	Counseling Hours
Saturday	8:30 AM - 11:10 AM, 12:31 PM - 3:10 PM
Sunday	
Monday	As per makeup day schedule
Tuesday	12:31 PM - 1:50 PM
Wednesday	1:51 PM - 3:10 PM

13	**Text Book**	None.
14	**Reference**	None.

<table>
<tr><td>15</td><td>Course Contents (approved by UGC)</td><td>Students will design simple embedded systems using the principles learned in CSE 425.</td></tr>
<tr><td>16</td><td>Course Outcomes (COs)</td><td>
<table>
<tr><th>COs</th><th>Description</th><th>Bloom's Domain</th><th>Program Outcome</th><th>Knowledge Profile</th><th>Complex Engg. Problems</th><th>Complex Eng. Activities</th></tr>
<tr><td>CO 1</td><td>Illustrate the interfacing of microcontroller with different input/output devices and simulate using Proteus to observe and analyze behaviors of different electronic hardware circuits.</td><td>C</td><td>e
Modern Tool Usage</td><td rowspan="3">K3 Engineering Fundamentals

K4 Specialist Knowledge

K5 Design

K6 Technology</td><td rowspan="3">(Any three)
P1 Depth of Knowledge

P2 Wide ranging

P3 No obvious solution

P7 Many Components</td><td rowspan="3">A1 Range of resources

A2 Level of interaction</td></tr>
<tr><td>CO 2</td><td>Design a basic embedded hardware group project.</td><td>A</td><td>c
Design of solutions</td></tr>
<tr><td>CO 3</td><td>Work in a team and communicate effectively.</td><td>A</td><td>i
Individual work and teamwork

j Communication</td></tr>
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<tr><td>17</td><td>Teaching Methods</td><td>Lecture, Laboratory exercise and reports, Project Developments.</td></tr>
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18	**CO with Assessment Methods**	

CO	Assessment Method	(%)
-	Attendance	10%
CO3	Class Performance	5%
CO3	Report/Viva	15%
CO2	Project	50%
CO1	Final Exam	20%

20 **Lab Outline**

Class	Topics/Assignments	COs	Lab Outcomes/Activities
Lab1	Experiment 1: An introduction to Arduino, Interfacing of Gas Sensor using Arduino & Showing the Sensor Data in OLED Display	CO1, CO2	To understand the configuration of Microcontroller Arduino board, learn how to code, connect arduino to perform simple projects and simulation of the such projects in Proteus.
Lab2	Experiment 1: An introduction to Arduino, Interfacing of Gas Sensor using Arduino & Showing the Sensor Data in OLED Display	CO1, CO2	To learn about gas sensor, understand how gas sensor works using Arduino. Also, learn about how OLED Display works. Interfacing Arduino, OLED Display and other sensors to perform different mini projects using Arduino. Also, learn how to use datasheet in real life experiment.
Lab3	Experiment 2: Wifi Communication and building IoT based systems using Arduino	CO1, CO2	To learn how to use microcontroller ESP32 using Arduino IoT Cloud. Also, how to interface gas sensor to send data via wifi to store and display on the cloud
Lab4	Experiment 3: Introduction to Raspberry Pi (Gen 4 Model B/B+)	CO1, CO2	To understand the configuration of the microprocessor Raspberry pi, how to

				setup the Pi and how to interface with Led using the GPIO of Pi.
	Lab5	Experiment No 4: Video processing using Raspberry Pi	CO1, CO2	To understand the configuration of Pi camera and how to use it using Raspberry Pi. Also, learn how simple computer vision problems can be solved using Pi.
	MIDTERM QUIZ			
	Lab6	Final Project Proposal	CO3	To understand the configuration of Arduino board and simulation in Proteus.
	Lab7	Project Update 1	CO3	To understand the analog to digital conversion and digital to analog conversion. How to use analog input-output using Arduino Uno board.
	Lab8	Project Update 2	CO3	To understand the fundamental of communication protocol and how configure in Arduino board.
	Lab9	Project Update 3	CO3	To understand how to interface RF 433MHz Transmitter/Receiver module with Arduino board
	Lab10	Final Presentation and Project showing	CO3	To understand the configuration of the Raspberry pi and how to interface with Led

Appendix 1: Assessment Methods

Assessment Types	**Marks**
Attendance	10%
Class Performance	5%
Report/Viva	15%
Project	50%
Final Exam	20%

Appendix 2: Grading Policy

Letter Grade	Marks %	Grade Point	Letter Grade	Marks%	Grade Point
A (Plain)	90-100	4.00	C+ (Plus)	70-73	2.33
A- (Minus)	86-89	3.67	C (Plain)	66-69	2.00
B+ (Plus)	82-85	3.33	C- (Minus)	62-65	1.67
B (Plain)	78-81	3.00	D+ (Plus)	58-61	1.33
B- (Minus)	74-77	2.67	D (Plain)	55-57	1.00
			F (Fail)	<55	0.00

Appendix-3: Program outcomes

	Program Outcomes
1	**Engineering knowledge:** Apply knowledge of mathematics, natural science, engineering fundamentals and Computer Science and Engineering to the solution of complex engineering problems.
2	**Problem analysis:** Identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
3	**Design/development of solutions:** Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
4	**Investigation:** Conduct investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions
5	**Modern tool usage:** Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems, with an understanding of the limitations.
6	**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 and solutions to complex engineering problems.
7	**Environment and sustainability:** Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex engineering problems in societal and environmental contexts.
8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
9	**Individual work and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	**Project management and finance:** Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one's 13 own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.