Course Description and Outcome Form
Department of Computer Science and Engineering
School of Engineering and Computer Science
BRAC University

A. Course General Information:

Course Code:	CSE360 CSE360L
Course Title:	Computer Interfacing Computer Interfacing Laboratory
Credit Hours (Theory+Lab):	3 + 0
Contact Hours (Theory+Lab):	3 + 1.5
Category:	Hardware
Type:	Required
Prerequisites:	CSE341 Microprocessors
Co-requisites:	None

B. Course Catalog Description (Content):

This course will give overview of computer interface components and their characteristics. It will cover details discussion on some programmable interfacing ICs, sensor, hardware, and software calibration on sensor interfacing, some processing devices which can interface computer with the real world and some output devices. This course also includes high power interface devices, LED, LCD, Seven segment display, transducers, stepper motors and peripheral devices. In addition, it will also introduce some software simulation tools to develop an interfacing system. Some advanced topics like Human Computer Interface (HCI), Brain Computer Interface (BCI) would be also discussed with some case studies.

C. Course Objective:

a) Introduce with basic Interfacing, Interfacing Components and their characteristics.
b) Outline the working mechanism of different types of sensors, sensing devices, hall-effect sensing, and real life application of some sensors.
c) Describe various I/O interfacing including GPIO using MCU/MPU development board and how Programmable Peripheral Interface (PPI) – 82C55 works.
d) Explain the working mechanism of Disk, Drum, Motors and Printers and their real life application.
e) Describe the types and formats of communication protocols like I2C, SPI, UART, USART, and USB.
f) Explain LCD, LED, Seven- segment display, Keyboard, Mouse work and interface with their interfacing principal
g) Discuss some advanced interfacing concept like BCI, HCI.

D. Course Outcomes (COs):

Upon successful completion of this course, students will be able to

Sl.	CO Description	Weightage (%)
CO1	**Recall** interfacing, interfacing components and their characteristics, high-end and low-end interfacing with necessary block diagrams.	05
CO2	**Understand** different types of sensors, sensing devices, piezoelectricity, hall-effect sensing, and real life application of some sensors.	10
CO3	**Demonstrate** various I/O interfacing including GPIO using MCU/MPU development board and Programmable Peripheral Interface (PPI) – 82C55.	15
CO4	**Inspect** Disk, Drum, Motors and Printers and their working mechanism.	10
CO5	**Illustrate** some computer interfacing and communication standard using I2C, SPI, UART, USART, and USB for better communication between processor and sensor ICs, handled with interrupt.	10
CO6	**Investigate** different display devices – LCD, LED, Seven- segment display, Keyboard, Mouse and their interfacing with their interfacing principal.	10
CO7	**Adapt** some advanced interfacing concept like BCI, HCI to develop a computer interfacing project for real life problem solving.	10

E. Mapping of CO-PO-Taxonomy Domain & Level- Delivery-Assessment Tool:

Sl.	CO Description	POs	Bloom's taxonomy domain/level	Delivery methods and activities	Assessment tools
CO1	**Explain** the interface of various sensors, sensing devices, piezoelectricity, hall-effect sensing in real life application.	a	Cognitive/Understand	Lecture	Quiz, Lab Experiment, Exam, Assignment
CO2	**Demonstrate** various I/O interfacing including GPIO using MCU/MPU development board and Programmable Peripheral Interface (PPI) – 82C55	e	Cognitive/ Apply Psychomotor/ Precision	T/L	Lab Experiment, Exam
CO3	**Illustrate** working mechanism of various peripheral devices such as Disk, Drum, Motors and Printers	a	Cognitive/ Understand	Lecture	Quiz and assignment, Exam
CO4	**Describe** computer interfacing and communication standards using I2C, SPI, UART, USART, and USB for better communication between processor and sensor ICs, handled with interrupt.	a	Cognitive/ Understand	T	Quiz, and Final.
CO5	**Design** digital system using various interface modules, sensors, display devices such as LCD, LED, Seven- segment display, Keyboard, Mouse etc.	c	Cognitive/Create	Lecture, Labo..	Project
CO6	**Adapt** some advanced interfacing concept like BCI, HCI to develop a computer interfacing project for real life problem solving.				Quiz, assignment and Final

F. Course Materials:

i. Text and Reference Books:

Sl.	Title	Author(s)	Publication Year	Edition	Publisher	ISBN
1	Microprocessor Architecture Programming and Applications with the 8085	Ramesh S. Gaonkar	1984	5th	Penram International Publishing Private Limited	81-87972-09-2
2	"Introduction to ARM(R) Cortex Microcontroller"	Jonathan Valvano,	2014	5th	Createspace (2012)	978-1477508992
3	Embedded Microcomputer Systems: Real Time Interfacing	Jonathan Valvano	2014	3rd	Cengage learning	13-978-1-111-42625-5

ii. Other materials (if any)

Lecture Notes and other material will be made available on the course website.(\\tsr\Summer-2019\CSE\KHR\CSE360\)

and .(\\tsr\Summer-2019\CSE\NSK\CSE360\). In addition, there are:

1) Presentation slides
2) Word Files
3) Book Chapter pdf
4) Videos and links

G. Lesson Plan:

No	Topic	Week/Lecture#	Related CO (if any)
1	Introduction to Computer interfacing: a) Introduction to Digital Systems b) Introduction to Computer Architecture c) Block Diagram of input output Interfacing d) Introduction to the system bus e) Introduction to low level program execution	**Week 1**	CO1
2	Sensing techniques and sensors a) Necessity and applications of sensor b) Physical properties of sensing (optics, sound, temperature, encoder etc.) c) Types of sensors (active, passive, simple, complex etc.) d) Sensor fusion e) Sensor circuit and hardware calibration f) Integration and software calibration of sensor g) Advance sensors	**Week 2, 3**	CO2
3	Computer interfacing ICs: a) Basic I/O (Memory mapper and Isolated) and diagrams. b) Introduction to 82C55 programmable interfacing IC c) Pin configuration and Block diagram	**Week 4, 5**	CO3

	d) Control word of 82C55 e) Time diagram of handshaking input and output		
4	Processing devices: a) Introduction to Microprocessor, Micro-Controller, Arduino, Raspberry-PI, FPGA. b) Processor architectures c) Digital IO, Analog Input, PWM, GPIO d) Programmable IO, Interrupt driven IO, DMA	**Week 6**	CO3
5	Output devices: a) Different types of Motor Characteristics b) Different types of Actuator Characteristics c) Working mechanism of Disk d) Working mechanism of Printer e) Device Driver Circuits f) Direct Memory Access (DMA)	**Week 7, 8**	CO4
6	Interfacing and communication standards: a) BUS Interface: SCSI, USB, SCSI, 1394, ATA, SATA, PCI b) Communication standards: RS-232, Wi-Fi, Bluetooth, RF, IR, GPS, GPRS, and GSM.	**Week 8, 9**	CO5
7	Display devices: a) LED and interfacing b) LCD and interfacing c) 7 segment display and interfacing d) multiple 7 segment display and interfacing	**Week 10**	CO6
8	Advanced researches on Interfacing: a) Brain Computer Interface b) Neural Network c) Artificial Intelligence	**Week 11, 12**	CO7
9	Introduce software and hardware tools for interfacing systems: a) Understanding Datasheet, PCB design, 3D printing b) Integrate Hardware and prototyping: Input, Output, Processor, Communication and Power c)Case Study d) Step of developing a interfacing project e) Documentation, Demonstration, Presentation and Publication	**Week 12, 13**	CO7

H. Assessment Tools:

Assessment Tools	Weightage (%)
1. Participation in class / Pop Quizzes	5 %
2. Quizzes	15 %
3. Mid Term Examination	20 %
4. Group assignments on project	10 %
5. Final	35%
6. Lab	15%
Total	**100 %**

I. CO Assessment Plan:

Assessment Tools	Course Outcomes						
	CO1	CO2	CO3	CO4	CO5	CO6	CO7
Homework		X		X			
Quizzes	X	X	X	X	X	X	X
Examinations	X	X	X	X	X	X	X
Project and Term Paper							

J. CO Attainment Policy:

As per Department of CSE Course Outcome Attainment Policy

K. Grading policy:

Student's grades are assigned according to the grading scale of the BRAC University Undergraduate Study and Examinations Regulations. In addition, the faculty are allowed to take into consideration the class average and standard deviation to reflect the actual class performance for student grade assignment. The grades at the university will be indicated in the following manner:

Marks	Grades
90-100	A (4.0)
85- <90	A- (3.7)
80- <85	B+ (3.3)
75- <80	B (3.0)
70- <75	B- (2.7)
65- <70	C+ (2.3)
60- <65	C (2.0)
57- <60	C- (1.7)
55- <57	D+ (1.3)
52- <55	D (1.0)
50- <52	D- (0.7)
<50	F (0.0)
P	Pass
I	Incomplete
W	Withdrawal
R	Retaken

L. Course Coordinator:

Nazmus Sakeef