EE2004: MICROCOMPUTER SYSTEMS

Effective Term
Semester A 2022/23

Part I Course Overview

Course Title
Microcomputer Systems

Subject Code
EE - Electrical Engineering
Course Number
2004

Academic Unit
Electrical Engineering (EE)

College/School
College of Engineering (EG)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
EE2000 Logic Circuit Design and CS2311 Computer Programming

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract

The aim of this course is to introduce the basic structure of modern computer systems and to learn programming computers at the assembly level with the concepts of instruction set architecture, datapath, control unit, memory system and I/O interfaces.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Describe the structure and major components of a microcomputer system		x	x	
2	Explain the idea behind memory hierarchy its use in memory caches and virtual memory.		x	x	
3	Describe how CPUs communicates with peripheral devices.		x	x	
4	Apply C/Assembly programming techniques to simple problems.		x	x	x

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Teaching and Learning Activities (TLAs)

	TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Explain key concepts in microcomputer systems	1, 2, 3, 4	3 hrs/week
2	Tutorial	Explain key concepts in microcomputer systems	1, 2, 3, 4	1 hr/week for 8 weeks,Or 2hrs/week for 13 weeks in Laboratory
3	Laboratory experiment Or Take-home mini-project	Allow students to gain practical experiences on interacting with the microcomputer system	1, 2, 3, 4	3 hrs/week for 5 weeks,Or Take-home mini-project

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Tests (min.: 2)	1, 2, 3, 4	32	
2	#Assignments (min.: 3)	1, 2, 3, 4	6	
3	Lab Exercises/Reports	1, 2, 3, 4	12	

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

2

Additional Information for ATs

Remark:
To pass the course, students are required to achieve at least 30% in course work and 30% in the examination.
When the laboratory experiments are involved in TLA, 75% laboratory attendance rate must be obtained.
When the mini-project is involved in TLA, 75% tutorial attendance rate must be obtained.

may include homework, tutorial exercise

Assessment Rubrics (AR)

Assessment Task

Examination

Criterion

Ability in achieving CILOs

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Coursework

Criterion

Ability in achieving CILOs

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

1. Introduction of Computer Structure: CPU, Memory, and IO, Bus and Data path
2. CPU registers and control units, bus and data path.
3. Assembly Language: Addressing modes, instruction sets, stack, and programming techniques
4. Memory System: Hierarchy: Memory systems. Input/output technique
5. Input/output techniques: programmed I/O and interrupt.

Laboratory Experiments:
1. Assembly language programming
2. I/O programming: Interacting with 7-segment LEDs and keypads
3. Interfacing with peripheral devices, such as timers and EEPROM.
4. Case study of serial communication protocols.

Reading List

Compulsory Readings

	Title
1	Lecture/tutorial notes

Additional Readings

	Title
1	Katzen, S, "The Essential PIC18 Microcontroller," Springer-Verlag, London, 2010.
2	Mazidi, MA, McKinlay, RD and Causey, D, "PIC Microcontroller and Embedded Systems Using Assembly and C for PIC18," Pearson Education, New Jersey, 2008.
3	Huang, HW, "PIC Microcontroller: An Introduction to Software and Hardware Interfacing," Delmar Cengage Learning, Clifton Park, NY, 2005.