CS3185: COMPUTER ARCHITECTURE

Effective Term
Semester A 2022/23

Part I Course Overview

Course Title
Computer Architecture

Subject Code
CS - Computer Science
Course Number
3185

Academic Unit
Computer Science (CS)

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
CS2115 Computer Organization

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract
To study fundamentals on computer system architectures. On completion of the course, students should be able to:- understand the design and processor functional units, register set, instruction encoding, assembler programming

with case study on a processor design;- identify some critical issues to achieve performance in processor design and multiprocessing systems;- understand the basic operations of cache memory and memory system, bus and I/O interface and operations, interrupt handling and design of I/O devices.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Describe the functional components in processor design, register sets, instruction codes and execution, addressing modes, basic assembly code and programming.		x		
2	Identify factors in the processor design to achieve performance in single and multiprocessing systems.			x	
3	Explain the operations of cache and main memory, I/O operations, bus controls, I/O interrupts and interfaces, I/O devices and characteristics.		x		
4	Apply the knowledge on system components and explore technological improvements in processor, memory, bus and I/O operations on the design of a typical computer system.			x	
5	Investigate on computer architecture for an application environment such as mobile or intelligent devices.		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	Introduce the basic concepts, design considerations and methodologies with case examples.	1, 2, 3	3 hours/week
2	Tutorial sessions	For discussions, exercise questions and case examples on the lecture topics.	1, 2, 3	8 hours/semester

3	Coursework assignments	Focus on practical questions as well as case examples for study. Students are required to solve and understand some assembly programming problems.	1, 2, 3, 4, 5	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Coursework	1, 2, 3, 4, 5	30	

Continuous Assessment (%)

30

Examination (%)

70

Examination Duration (Hours)

2

Additional Information for ATs

For a student to pass the course, at least 30% of the maximum mark for the examination must be obtained.

Assessment Rubrics (AR)

Assessment Task

Coursework

Criterion

Ability to explain the introduced concepts

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

Examination

Criterion

Ability to learn the topics explained

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

Computer Models. Central Processing Unit. Memory System. Cache memory organization. I/O Interfaces. CISC and RISC. Multiprocessors. Bus protocol.

Syllabus:

- Basic Computer Models and Hardware Components
- Number Systems
- Central Processing Unit
- Processor Instructions and Addressing Modes
- Assembly Language
- Processor Design, CISC and RISC and Multiprocessors
- Memory System and Cache Memory Organization
- Input/Output Subsystems
- Peripheral Devices

Reading List

Compulsory Readings

	Title
1	Hamacher V.C., Vranesic Z.G., Zaky S., (2011). Computer Organization and Embedded Systems. McGraw-Hill, 6th edition.
2	Stallings W. (2009). Computer Organization and Architecture: Designing for Performance. Prentice Hall, 8th edition.

Additional Readings

	Title
1	Tanenbum A. (2006). Structure Computer Organization. Pearson Prentice Hall, 5th edition.
2	Mano M.M., (2000). Computer System Architecture. Prentice Hall (2000), 3rd edition.