GAU, Faculty of Engineering

Course Unit Title	Computer Architecture
Course Unit Code	CEN450
Type of Course Unit	Technical Elective, Computer Engineering Students
Level of Course Unit	4th Year BSc
National Credits	3
Number of ECTS Credits Allocated	6 ECTS
Theoretical (hour/week)	3
Practice (hour/week)	-
Laboratory (hour/week)	-
Year of Study	4
Semester when the course unit is delivered	7/8
Course Coordinator	
Name of Lecturer (s)	
Name of Assistant (s)	-
Mode of Delivery	Face to Face
Language of Instruction	English
Prerequisities and co-requisities	CEN301 – Microprocessors
Recommended Optional Programme Components	Basic bacground Digital Design and Microprocessors

Objectives of the Course:

- Familiarize students with the internal structure of computer systems.
- Highlighting important issues specifically computer architecture, organization, its performance, design and relation to the system software.
- Gain an insight into nature of design process and the associated trade-offs.
- Show how to design a computer or understand how a system works and why it performs as it does.
- Providing students with the necessary knowledge and skills required to understand the interaction between H/W and S/W at a lower level that offers a framework for understanding the fundamentals of computing.

Learning Outcomes

When this course has been completed the student should be able to		Assesment.
1	Explain the internal structure of computer systems.	1
2	Recognize different types of architectures and the difference between computer architecture and organization.	1
3	Apply the various performance measures to compare between different computer systems.	1
4	Recognize different techniques used in the design of computer system components.	1
5	Know how to design a computer system.	1
6	Show how a computer system works and why it performs as it does.	1
7	Explain the interaction between H/W and S/W at a variety of levels that offers a framework for understanding the fundamentals of computing.	1
8	Tie ideas from the course more closely to real world outside the computing industry.	1

Assesment Methods: 1. Written Exam, 2. Assignment 3. Project/Report, 4.Presentation, 5 Lab. Work

Course's Contribution to Program

		CL
1	Ability to understand and apply knowledge of mathematics, science, and engineering	4
2	Ability to design and conduct experiments as well as to analyze and interpret data	1
3	Ability to work in multidisciplinary teams while exhibiting professional responsibility and ethical conduct	1
4	Ability to apply systems thinking in problem solving and system design	3
5	Knowledge of contemporary issues while continuing to engage in lifelong learning	2
6	Ability to use the techniques, skills and modern eng. tools necessary for engineering practice	1
7	Ability to express their ideas and findings, in written and oral form	1
8	Ability to design and integrate systems, components or processes to meet desired needs within realistic constraints	4
9	Ability to approach engineering problems and effects of their possible solutions within a well structured, ethically responsible and professional manner	3
10	To apply fundamental concepts of software design, database design, data processing and artificial intelligence in the modeling, designing, implementing, testing and deploying software solutions.	1
11	Ability to analyse and design hardware systems by applying the principles of embedded systems, microprocessors, computer networks, distributed systems and data communication.	4

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate 4: High, 5:Very High)

Course Contents

Week			Exams
1	Chapter 1	Introduction to computer architecture. Concept of performance.	
2		Instruction Set Architecture (ISA)	
3		Arithmetic operations	
4	Chapter 2	Floating point operations	
5		Datapath design	
6		Datapath design	
7			Midterm
8	Chapter 3	Microprogramming and exceptions	
9		Pipelining	
10		Handling Branch Instructions	
11		Handling Branch Instructions	
12	Chapter 4	Memory and Cache	Quiz
13		Virtual Memory	
14		A Common Framework for Memory Hierarchy	
15			Final

Recommended Sources

Textbook:
D. A. Patterson, J. L. Hennessy, "Computer Organization & Design: The Hardware / Software Interface", Morgan Kaufmann, 4th Edition, 2011

Supplementary Material (s):
Hennessy J.L., Patterson D.A., "Computer Architecture: A Quantitative Approach", Morgan Kaufmann, 4th Edition, 2006

Assessment

Attendance	10%	Less than 25% class attendance results in NG grade.
Laboratory	-	
Midterm Exam	30%	Written Exam
Quiz	20%	Written Exam
Final Exam	40%	Written Exam
Total	100%	

ECTS Allocated Based on the Student Workload

Activities	Number	Duration (hour)	Total Workload(hour)
Course duration in class (including the Exam week)	15	3	45
Labs and Tutorials	-	-	-
Assignments	-	-	-
Project/Presentation/Report Writing	1	25	25
E-learning Activities	-	-	-
Quizzes	1	15	15
Midterm Examination	1	15	15
Final Examination	1	15	15
Self Study	15	4	60
Total Workload			175
Total Workload/30 (h)			5.83
ECTS Credit of the Course			6