هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	**Computer Architecture and Design**
Course Code:	**CEN 1403**
Program:	**Bachelor in Computer Engineering**
Department:	**Computer Engineering**
College:	**Faculty of Computer and Information Technology**
Institution:	**University of Tabuk**
Version:	**1.0**
Last Revision Date:	**27 July 2022**

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☐ Elective		
3. Level/year at which this course is offered: (7/4)					
4. Course general Description:					
This course aims to provide a foundation for students to understand modern computer system architecture and to apply these insights and principles to future computer designs. The course describes a broad range of architectural designs and to contrast them, highlighting the design decisions they incorporate, and how these design decisions impact the performance. Topics covered include: Design of a hardwired-controlled basic computer, Processor organization, ALUs, bus and stack organizations, Instruction sets and instruction formats, System software, Micro-programmed CPU, Comparison between CISC and RISC, Introduction to memory organization, I/O operations, Introduction to Multi-core and Multiprocessors, and parallel processing techniques.					
5. Pre-requirements for this course (if any)**:**					
CSC 1202					
6. Co-requisites for this course (if any)**:**					
N/A					
7. Course Main Objective(s):					
▪ Describe the general organization and architecture of computers. ▪ Identify computers major components and study their functions. ▪ Explain the algorithms used for Memory and storage management. ▪ Introduce hardware design issues of modern computer architecture. ▪ Understand the trade-offs between cost and performance in computer design.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	**45**	**100%**
2	E-learning	-	-
3	Hybrid	-	-

No	Mode of Instruction	Contact Hours	Percentage
	• Traditional classroom • E-learning		
4	Distance learning	-	-

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	-
3.	**Field**	-
4.	**Tutorial**	-
5.	**Others (specify)**	-
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**Describe the general organization and architecture of computers**	**K1**	**Lectures, textbooks, provided handouts, references.**	**Exams, quizzes, assignments.**
1.2	**Identify computers major components and study their functions.**	**K1**		
1.3	**Explain the algorithms used for Memory and storage management.**	**K3**		
1.4	**Introduce hardware design issues of modern computer architecture.**	**K5**		
1.5	**Understand the trade-offs between cost and performance in computer design**	**K4**		
2.0	**Skills**			

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
2.1	**Analyze techniques and algorithms related to computer architecture.**	**S1**	**Lectures, textbooks, provided handouts, references.**	**Exams, quizzes, assignments,**
2.2	**Compare the knowledge, tools and techniques related to computer architecture and design**	**S3**		
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2				

C. Course Content

No	List of Topics	Contact Hours
1.	Overview of Computer Systems - Defining computer architecture, classes of computers, technology trends, cost, performance metrics, Amdahl's law, and benchmarks.	3
2.	Assessing and Understanding Performance - Methods of analyzing and measuring performance of computer systems.	3
3.	Bus Architecture - Types of buses used in computer systems for connecting different components.	3
4.	Cache Memory - Memory hierarchy concept, cache organization, cache policies and technologies.	3
5.	Advanced RAM Organization - Memory technologies used in main memory like DRAM, SRAM, their structure and operation.	3
6.	Secondary Storage - Hard disk drives, SSD technologies used for persistent storage.	3
7.	CPU Structure - Functional units, registers, data path, decoder of a basic CPU.	3
8.	CPU Functions - Instruction fetch, decode, execute stages and pipelining	3
9.	Reduced Instruction Set - RISC architecture concepts and advantages over CISC	3
10.	Instruction-Level Parallelism - Exploiting parallelism through pipelining and superscalar processors.	3
11.	The IA-64 Architecture 1 - Details of Intel IA-64 architecture with emphasis on pipeline and parallelism.	3
12.	The IA-64 Architecture 2 - Memory subsystem and IO architecture of IA-64.	3
13.	Control Unit Operation - Structure and working of the central control unit.	3
14.	Microprogrammed Control - Microcode and microprogrammed implementation of control unit.	3
15.	Parallel Processing - Flynn's taxonomy of parallel processing architectures.	3
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Two Assignments	5,14	10%
2.	Two Quizzes	4,9	10%
3.	Two Midterm Exam	7,12	40%
4.	Final Exam	16	40%
5.			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	▪ Computer Organization and Architecture, William Stallings, Prentice Hall, ISBN: 0-13-081294-3. ▪ The Architecture of Computer Hardware and Systems Software, Irv Englander, Willey, ISBN:0-471-07325-3. ▪ Systems Architecture, Stephen Burd, Course Technology, ISBN: 0-619-03418-1.
Supportive References	▪
Electronic Materials	
Other Learning Materials	-

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data show

Items	Resources
Other equipment (depending on the nature of the specialty)	**TBA**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of Teaching	Faculty, Program Leaders, and Advisory Board	Both Direct and Indirect
	Students	Indirect
Effectiveness of Students Assessment	Faculty, Program Leaders, Advisory Board, and Independent Opinion	Both Direct and Indirect
Quality of Learning Resources	Faculty, Students, and Advisory Board	Indirect
The Extent to which CLOs have been Achieved	Faculty, Program Leaders, Advisory Board, and Independent Opinion	Direct (as in section B) and Indirect/Surveys
	Students	Indirect
Other	-	-

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	