اعتماد
NCAAA

T4

2020

Course Specifications

Course Title:	Computer Organization and Design
Course Code:	503325-3
Program:	Bachelor in Computer Engineering
Department:	Department of Computer Engineering
College:	College of Computers and Information Technology
Institution:	Taif University

Table of Contents

A. Course Identification

1. Credit hours: 3 Hours	

2. Course type

a.   University ☐   College ☐   Department ■   Others ☐

b.   Required ■   Elective ☐

3. Level/year at which this course is offered: Level 6 / Year 3

4. Pre-requisites for this course (if any)**:**
Computer Architecture (503323-3)

5. Co-requisites for this course (if any)**:**
None

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	3	100%
2	**Blended**	0	0
3	**E-learning**	0	0
4	**Distance learning**	0	0
5	**Other**	0	0

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	45
2	**Laboratory/Studio**	0
3	**Tutorial**	0
4	**Others** (Project)	0
	Total	45

B. Course Objectives and Learning Outcomes

1. Course Description

Introduction to computer organization; Performance Evaluation and its role in computer system design; Instruction Set Architecture; Assembly Language; Machine Language; Data processing; Arithmetic unit; Datapath design; Control unit design; pipelining; memory hierarchy; Cache memory; Virtual memory; peripheral and I/O devices.

2. Course Main Objective

1. Obtain basic knowledge of Basic Computer Organization and Design; Computer Evolution and Performance.
2. Have good understanding of the Central Processing Unit, Datapaths, MIPS Assembly Language Programming, Pipelining, Multiprocessing.
3. Obtain knowledge of Memory Hierarchy Design and Memory Management; Cache Organization and Cache Memory Design; Virtual Memory; Input and Output Organization.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Describe the Basic computer system Organization and Design, and the role of performance in designing computer systems.	K1
1.2		
1.3		
1...		
2	**Skills :**	
2.1	Design an instruction set and how to evaluate its impact on processor design (ALU and processor datapath and control).	S1
2.2	Design pipeline processor including datapath and control.	S1
2.3	Describe memory hierarchy and cache memory design based on the characteristics of the expected workload.	S1
2.4	Design an I/O system, and plan bandwidth requirements to support heterogeneous I/O devices.	S1
3	**Values:**	
3.1		
3.2		
3.3		
3...		

C. Course Content

No	List of Topics	Contact Hours
1	Instruction Set Architecture. The role of an instruction set interface between hardware and software; issues to consider when designing an instruction set; addressing modes.	4
2	Arithmetic and Logic Units (ALU) for computers. Number system, addition and subtract, adders; multiplication and multipliers; division and dividers; floating point numbers and floating point units; Examples from existing systems.	4
3	Processor Design. Datapath and control; single cycle design and implementation; simplifying control design; multicycle implementation of datapath and control; example from a real system.	4
4	Processor Design. Datapath and control; single cycle design and implementation; simplifying control design; multicycle implementation of datapath and control; example from a real system.	4
5	Pipelining. Basic concepts in pipelining; datapath for pipeline processor implementation, control design for pipelines, superscaler design; Examples.	4
6	Memory Hierarchy: Cache memories. Introduction to caches, measuring and improving performance of caches; design alternatives, direct map, associative caches; replacement policies; examples.	5
7	Memory Hierarchy: Cache memories. Introduction to caches, measuring and improving performance of caches; design alternatives, direct map, associative caches; replacement policies; examples.	5

8	Virtual Memory: basic design, address translation, placement and replacement; cost and performance issues; common framework for memory hierarchies,		5
9	Input-Output and Peripheral Devices. I/O performance and measures, technology and characteristics of disks. Busses and protocols. Connecting I/O devices to memory and processor.		5
10	Revision and Problem solving		5
Total			45

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Describe the Basic computer system Organization and Design, and the role of performance in designing computer systems.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
1.2			
…			
2.0	**Skills**		
2.1	Design an instruction set and how to evaluate its impact on processor design (ALU and processor datapath and control).	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments Oral Test
2.2	Design pipeline processor including datapath and control.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments Oral Test
2.3	Describe memory hierarchy and cache memory design based on the characteristics of the expected workload.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments Oral Test
2.4	Design an I/O system, and plan bandwidth requirements to support heterogeneous I/O devices.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments Oral Test
3.0	**Values**		
3.1			
3.2			
…			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments	Continues	15%
2	Midterm Exam	7	20%
3	Quiz Exam	Continues	15%
4	Final Exam	16	50%
5			

#	Assessment task*	Week Due	Percentage of Total Assessment Score
6			
7			
8			

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Teaching staff provide at least 6 office hours for students to help them in the course as well as in any other academic issues.
- Consultation can also be done 24 hours/ 7days through university Edugate (Tawasol) or emails or BB messages.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	David Patterson and John Hennessy, Computer Organization and Design, 5th edition, The Morgan Kaufmann Series, 2012.
Essential References Materials	William Stallings, Computer Organization and Architecture, 9th edition, Pearson, 2012
Electronic Materials	None
Other Learning Materials	None

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Traditional Classrooms
Technology Resources (AV, data show, Smart Board, software, etc.)	Data show
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Indirect (Survey)

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Extent of achievement of course learning outcomes	Students Faculty Curriculum committee	Student surveys and student evaluation Indirect (Survey) Direct (Course Report) Direct
Quality of learning resources	Program leaders Staff members Students	Indirect (Survey)
Improvement of teaching	Course coordinator	Deficiencies based on student evaluation, course reports, and program assessment.
Verifying standards of student achievement	Curriculum committee	Review CAF (course assessment file) Alumni survys

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	CE council/ curriculum committee
Reference No.	
Date	

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Computer Engineering Department
TU
جامعة الطائف
TAIF UNIVERSITY