جامعة الإسراء
ISRA UNIVERSITY

Course Syllabus

According to JORDAN National Qualification Framework (JNQF)

Course Name: Computer Design and organization

Course Number: 06052221

General Course Information:

Course title	Computer Design and Organization
Course number	06052221
Credit hours	3 Hours
Education type	Face-to-Face
Prerequisites/corequisites	Logic Design1 (0600105)
Academic Program	Computer Science
Program code	602
Faculty	Faculty of Information Technology
Department	Computer Sciences
Level of course	2
Academic year /semester	2021/2022 Second Semester
Awarded qualification	BSc
Other department(s) involved in teaching the course	Software Engineering
Language of instruction	English
Date of production/revision	June. 2022

Course Coordinator:

Coordinator's name	Dr. Dimah Fraihat
Office No	4109
Office Phone extension number	4261
Office Hours	*Sun*. (1:00-3:00), *Mon, Wed*. (11:00-12:00), *Tue*. (1:00: -2:00)
Email	d.fraihat**@iu.edu.jo**

Other Instructors:

Instructor name	
Office No	
Office Phone extension number	
Office Hours	
Email	

Course Description *(English/Arabic)*:

English	The purpose of this course is to explore the levels of architecture and organization in digital computers: logic circuit design, integrated circuits and assembly language coding.
Arabic	دراسة عمارة وتنظيم أجهزة الكمبيوتر الرقمية، وتوضيح تمثيل البيانات في الكمبيوتر وآلة Von Neumann والأنظمة الموازية والموزعة وبرامج النظام اضافة الى برمجة لغة التجميع

Textbook: *Author(s), Title, Publisher, Edition, Year, Book website.*

1. Patterson, D.A., & Hennessy, J.L. Computer Organization and Design MIPS edition: The Hardware/Software Interface, 6th edition. Morgan Kaufmann, 2020.

References: ***Author(s), Title, Publisher, Edition, Year, Book website.***

1. William Stallings, Computer Organization and Architecture, Pearson; 11th edition, 2018.
2. Moodle e-learning course website available on: http://elearn.iu.edu.jo/

Course Educational Objectives (CEOs):

1.	Outlines the basic components of modern hardware and software.
2.	Explain the modern computer system architecture design issues.
3.	Examine the arithmetic computer operations.
4.	Identify the major computer system architecture performance issues
5.	Write assembly language programs to perform I/O operation.

Intended Learning Outcomes (ILO's):

	Subject Intended learning outcomes (ILOs) describe what students are expected to know and be able to do at the end of the course. These outcomes are related to the knowledge, skill and competence that students acquire:	**Relationship to CEOs**	**Contribution to PLOs**	**Bloom Taxonomy Levels***	**Descriptors****
	Knowledge and Understanding:				
A1	Describe the fundamental organization of a computer system.	1	1,2	1	K
A2	Explain Von Neumann architecture: hardware (gates, registers, processing unit, and memory), sequencing (finite state machines).	1,2	1,2	2	K
	Intellectual skills:				
B1	Construct arithmetic operation from a given data representation(numbers, characters, strings, structures).	3	1,2	3	S
	Subject specific skills:				
C1	Analyze system software's (Assemblers, Linkers, and the SPIM Simulator)	4,5	1,2	3	S
	Transferable skills:				
D1	Write a program using assembly language and Instruction set.	5	1,2	2	S
D2	Analyze parallel and distributed computer architecture systems	4	1,2	4	C

***Bloom Taxonomy Levels**

Level #	1	2	3	4	5	6
Level Name	**Knowledge**	**Comprehension**	**Application**	**Analysis**	**Evaluation**	**Synthesis**

** **Descriptor (National Qualification Framework Descriptors): K : Knowledge, S: Skill, C: Competency.**

Program Learning Outcome (PLOs):

Program Learning Outcomes describe what students are expected to know and be able to do by the time of graduation. These relate to the knowledge, skills, and behaviours that students acquire as they progress through the program. A graduate of the (CIS) program will demonstrate:		**Descriptors****		
		K	**S**	**C**
1.	Analyse a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.	✓		
2.	Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.		✓	
3.	Communicate effectively in a variety of professional contexts.			✓
4.	Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.			✓
5.	Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.			✓
6.	Apply computer science theory and software development fundamentals to produce computing-based solutions. [CS]		✓	

**** Descriptors according to the national qualifications framework (K: Knowledge, S: Skill, C: Competency)**

Weekly Schedule ***(please choose the type of teaching)***

■ **Face to Face**

□ **Hybrid** *(**2 Lectures** Face – To - Face **+1 Lecture** Asynchronous)*

□ **Hybrid (***1* ***Lectures*** *Face – To - Face* ***+1 Lecture*** *Asynchronous)*

□ **Online** *(**2 Lectures** Synchronous +**1 lecture** Asynchronous)*

Week	First Hour (Asynchronous)	Second Hour (synchronous)	Third Hour (synchronous)	Ach. ILOs	Ach. PLOs	Descriptors*
1, 2	**Course Overview**	**Introduction:** • Definitions: Architecture and Organization	• The von Neumann Model • The System Bus Model • Levels of Machines	A1 A2	1	K
3	**Data Representation:** Understand different number formats (Dec, Hex, bin)	converting Dec to Hex and vice versa).	Understand ASCII, BCD codes	A2 B1	1 2	K S
4	Arithmetic:	Explain fixed point addition, subtraction, multiplication and division.	Describe BCD and floating-point arithmetic.	B1	2	S
5	Explain the differences between ROM, PROM, and EPROM+ Cache memory	Explain the differences between ROM, PROM, and EPROM+ Cache memory	Discussion	A1	1	K
6	Explain the difference between ROM and RAM, and between static and dynamic memory	Explain the difference between ROM and RAM, and between static and dynamic memory	Discussion	A1	1	K
7	**The Instruction Set Architecture and Languages:** • Describe the basic architectural components involved in program execution	• State the role of the system bus in interconnecting the components. • Describe the low level machine. • Describe linking, loading and macros	• Use assembly language instruction sets to write assembly language programs • Explain microinstruction, macroinstruction, microprogramming Practical Application	A2 C1 D2	1 2	K S C
Midterm						
9	• Instruction Sets: Characteristics and Functions • Machine Instruction characteristics	• Type of Operands • Type of Operations	• Instruction Sets: Addressing Modes and addressing formats • Instruction Formats	C1 D1	2	S

10	**Data path, Control, Memory and I/O** • Analyze step-by-step the data path and control unit both micro programmed and hardwired	Describe bus communications and bus access methods.	External devices	A2	1	K
11	• I/O Modules • Programmed I/O	• Interrupt driven I/O. • Direct Memory Access	I/O Channels and Processors	C1	2	S
12	**Trends in Computer Architecture** • State the motivation for RISC processors and VLIW machines.	Describe parallel and distributed architecture systems	Multiple Processor	A1	1	K
13	**Processor structure and function** • Processor Organization	Instruction Cycle	Instruction Pipelining	A1 D2	1 2	S C
14 15	Multiple Processor Organizations	Symmetric Multiprocessors	• Multithreading and Chip Multiprocessors • Clusters	D2	2	S
16	**Final exam**					

* **K: Knowledge, S: Skills, C: Competency**

Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

- Lecture Notes
- Class activities
- Labs

Course Policies:

A- Attendance policies:

The maximum allowed absences is 15% of the lectures.

B- Absences from exams and handing in assignments on time:

Midterm exam can be retaken based on approval of excuse by the instructor's discretion.

Not handing assignment on time will incur penalties.

C- Academic Health and safety procedures

D- Honesty policy regarding cheating, plagiarism, and misbehaviour:

Cheating, plagiarism, misbehaviour will result in zero grade and further disciplinary actions may be taken.

E- Grading policy:

- All homework is to be posted online through the e-learning system.
- Exams will be marked within 72 hours and the marked exam papers will be handed to the students.
- Online Activities (Course Videos, Practice labs, Discussion Forums, Quizzes) **20%**
- Midterm **30%**
- Final Exam **50%**

F- Available university services that support achievement in the course: **E-Learning Platform, Labs, Library.**

Required equipment:

- **PC / Laptop**
- **Internet Connection**
- **Access to the IU E-Learning Platform at: https://elearn.iu.edu.jo/**
- **E-learning plan**

Assessment Tools implemented in the course:

- **Final Exam**
- **Midterm Exam**
- **Quizzes**
- **Homework**
- Integrative Projects.
  - Written Reports.
  - Class participation
  - Discussion

Responsible Persons and their Signatures:

Course Coordinator	**Dr. Dimah Fraihat**	**Completed Date**	**2022/6/27**
		Signature	

Received by (Department Head)	**Dr. Faisal Alzyoud**	**Received Date**	
		Signature	