

Course specification
(2204 Computer Organization & Assembly Language)

Faculty:	HICIT- Higher Institute for Computers & Information Technology-El Shorouk Academy
Programme(s) on which the course is given	Under graduate program in Computer Science
Major or minor element of programmes	Compulsory
Department offering the programme	Department of Computer Science
Department offering the course	Department of Computer Science
Academic year / Level	Second Year
Semester offered	Second Semester
Date of specification approval	1/8/2022

A- Basic Information

Title: Computer Organization & Assembly Language programming	Code: 2204		
Weekly Hours:			
Lecture : 4	Exercise: -	Practical :3	Total: 7

B- Professional Information

1 - Overall aims of course:

The objectives of this course are to introduce the principles of Modern Computer Architecture and design. Computers are built from the following key components: Data paths, Control unit (controls everything in the CPU), Memory (main memory, cache, disk ...) to store code & data, and Input / Output mechanisms to communicate with the outside world. The first four components will be thoroughly discussed. At the end of the course students should be able to:

- Understand computer fundamentals as well as learn architecture of the digital computer
- Understand the various components of a computer processor unit and a design of control unit by using hardwired and microprogramming methods.
- Understand the memory organization.
- Write a program in Assembly Language to handle keyboard and screen processing
- Assemble and link separate programs into executable program

2- Program ILOs Covered by Course

Program Intended Learning Outcomes			
Knowledge and understanding	Intellectual Skills	Professional and practical skills	General and Transferable skills
A8, A10, A15, A18, A19	B4, B7, B8, B16	C1, C5, C6, C14	D9

2- Intended learning outcomes of course (ILOs)

Upon successful completion of this course, students should be able to:

- describe the functional components in processor design, register sets, instruction codes and execution, addressing modes, basic assembly code and programming.
- identify factors in the processor design to achieve performance in single and multiprocessing systems.
- explain the operations of cache and main memory, I/O operations, bus controls, I/O interrupts and interfaces, I/O devices, and characteristics.
- 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.

a- Knowledge and understanding

Upon successful completion of the course, graduates should be able to:

- a1. Define fundamentals in computing, including hardware and operating systems. [A 8 , A 1 9]
- a2. Describe functions of the basic building blocks of a computer system.[A18, A19]
- a3. Explain a critical understanding of the broad context within computing including issues of reliability.[A8, A15]
- a4. Identify how computers execute instructions. [A18, A19]
- a5. Explain the basic operations of cache and main memory, I/O operations, bus, interrupt and peripheral devices as well as analyzing the performance of different designs.[A8, A10, A19]

b- Intellectual skills

- b1. Analyze various architectures and explain the design concepts for analyzing computer systems. [B4, B7, B8]
- b2. Design ssequence of complete computer instructions.[B7, B8]
- b3. Analyze attributes and components of computer systems. [B4, B16]

c- Professional and practical skills

- c1. Simulate micro instruction executions.[C1,C5,C6]
- c2. Develop computer-based systems using appropriate tools and techniques.[C5,C6]
- c3. Operate computing equipment efficiently, taking into account its logical and physical properties.[C14,C5]

d- General and transferable skills

- c1. Work in stressful environment and within constraints.[D9]
- c2. Manage tasks and resources.[D9]
- c3. Communicate effectively.[D9]

3. Course Content

Topic	Hours	Lec. Hours	Exc/Lab
I Introduction to Computer Organization & Architecture, Basic Computer Components, Computer Assembly language Programming	14	8	6
Interconnection Structure & Bus Architecture Overview	7	4	3
A Top-Level View of Computer Function and Interconnection	7	4	3
Computer basic unit organization: Memory Design(1), (2)	14	8	6
Interrupt Handling Mechanism.	7	4	3
Computer cycles: Fetch, Decode, Execute	7	4	3
Processor Organization, Register Organization & Design Issues.	7	4	3
Processor Organization & Instruction Sets: Characteristics and Functions	7	4	3
Processor Organization, Addressing Techniques	7	4	3

I/O devices Interfacing	11	5	6
Selected Topics	3	3	-

4- Teaching and learning methods

Teaching and learning methods	Used
Active Learning	
Lectures (blending learning – online learning using virtual classroom)	√
Tutorial Exercises (hybrid learning – online learning)	√
Practical Lab (blending learning– online learning)	√
Exercises	√
Discussions.	√
Self – Learning strategy	
Reading material	√
Websites search	√
Research and reporting	√
Self-studies	√
Experimental strategy	
Group work	√
Presentation	-
Problem solving strategy	
Problem solving/problem solving learning based	√
Case study	-
Synchronous E-Learning	
Virtual lab	-
Virtual class	-
Chat Room	-
Video lectures	√
Asynchronous E-Learning	
E-Learning	√

5 -Student assessment methods

Methods	Assessment	Used
Electronic Midterm Exam	To assess the knowledge and understanding achieved by the student during the previous weeks. (Online on e-learning hub)	√
Pencil-to-Paper Final Exam	To evaluate what the student gain at the end of the course, and to assess: the knowledge and understanding, general skills, and intellectual skills.	√
Course Project	To allow students work in team, and to evaluate knowledge, understanding, intellectual, and transferable skills. (Online on e-learning hub, FTF)	-

Electronic Course Work & Quizzes	To keep the student always in the course, and to evaluate knowledge, understanding, intellectual, and transferable skills. (Online on e-learning hub)	√
Participation	To assess the knowledge and understanding achieved by the student during the previous weeks.	√

Assessment Schedule

Assessment	Week #
Participation	3-14
Mid Term Exam	8
Final Exam	16
Course Work & Quizzes	2-14

Assessment Weight

Assessment	Weight %
Participation	10%
Mid Term Exam	
Final Exam	80%
Course Work & Quizzes	10%
Total	100

Course Work & Quizzes: (Short Exams, Assignments, Researches, Reports, Presentations, Class/Project discussion)

6 -List of references

Essential books (text books)	<ul style="list-style-type: none"> - Stallings, W. (2015, January 12). <i>Computer Organization and Architecture</i>. - IBM Assembly Language and Programming by Peter Abe, Prentice Hall
Course notes	<ul style="list-style-type: none"> - [http://www.eiilmuniversity.co.in/downloads/Computer-Organization-&-Assembly-LanguageF.pdf] - [https://www.iare.ac.in/sites/default/files/lecture_notes/COA_LECTURE_NOTES_0.pdf]
Recommended books	<ul style="list-style-type: none"> - Pyeatt, L. D. (2016, May 3). <i>Modern Assembly Language Programming with the ARM Processor</i>. Newnes.
Periodicals, website	<p>Powerpoint presentations of all course materials All labs material [https://moodle.sha.edu.eg/course/view.php?id=2256]</p>

7 -Facilities required for teaching and learning

Computer laboratories: equipped with suitable number of PC computers

Computer Classrooms: equipped with PC computer +Data show + Screen
White board and colored pens.

Software required: 8086 Emulator, IBM XT Emulator, IBM Clone Emulator.

8-Course Matrices

8.1-Course Content/ILO Matrix

Course Contents	Knowledge & understanding					Intellectual skills			Professional and practical skills			General		
	a1	a2	a3	a4	a5	b1	b2	b3	c1	c2	c3	d1	d2	d3
I Introduction to Computer Organization & Architecture, Basic Computer Components, Computer Assembly language Programming	√													
Interconnection Structure & Bus Architecture Overview		√												
A Top-Level View of Computer Function and Interconnection			√											
Computer basic unit organization: Memory Design(1), (2)				√										
Interrupt Handling Mechanism.						√	√			√	√			
Computer cycles: Fetch, Decode, Execute					√		√	√			√			
Processor Organization, Register Organization & Design Issues.									√	√	√			
Selected Topics												√	√	√

8.2-Learning Method /ILO Matrix

Learning Methods	Knowledge & understanding					Intellectual skills			Professional and practical skills			General		
	a1	a2	a3	a4	a5	b1	b2	b3	c1	c2	c3	d1	d2	d3
Lectures (blending learning – online learning using virtual classroom)	√	√	√	√	√	√	√	√						
Tutorial Exercises (hybrid learning – online learning)						√	√	√						
Practical Lab (blending learning– online learning)						√	√	√	√	√	√			
Exercises						√	√	√						
Discussions.						√	√	√	√	√	√	√	√	√
Reading material	√	√	√	√	√	√	√	√	√	√	√			
Websites search	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Research and reporting	√	√	√	√	√							√	√	
Self-studies	√	√	√	√	√				√	√	√			
Group work										√	√	√	√	√
Problem solving/problem solving learning based							√	√						
E-Learning	√	√	√	√	√									

8.3 Assessment Methods /ILO Matrix

Assessment Methods	Knowledge & understanding					Intellectual skills			Professional and practical skills			General		
	a1	a2	a3	a4	a5	b1	b2	b3	c1	c2	c3	d1	d2	d3
Electronic Mid Term Exam	√	√	√	√	√	√	√	√						
Final Exam	√	√	√	√	√	√	√	√						
Course Work & Quizzes	√	√	√	√	√	√	√	√	√	√	√	√	√	√

9. Course ILOs Vs Program ILOs

Course ILOs \ Prog ILOs		Knowledge & understanding					Intellectual skills				Professional and practical skills				General
		A8	A10	A15	A18	A19	B4	B7	B8	B16	C1	C5	C6	C14	D9
K&U	a1	√				√									
	a2				√	√									
	a3	√		√											
	a4				√	√									
	a5	√	√			√									
Int.	b1						√	√	√						
	b2							√	√						
	b3						√			√					
P. & P.	c1									√	√	√			
	c2										√	√			
	c3										√	√	√		
General	d1														√
	d2														√
	d3														√

Course coordinator: Dr Tarak salah ()

Head of Department: Dr. Ahmed El-Abbassy ()

Date: 1/8/2022