

Module (Course Syllabus) Catalogue 2022-2023

College/ Institute	Erbil Technical Engineering	
Department	ISED	
Module Name	Computer Architecture	
Module Code	COA405	
Degree	Technical Diploma <input type="checkbox"/>	Bachelor <input checked="" type="checkbox"/>
	High Diploma <input type="checkbox"/>	Master <input type="checkbox"/> PhD <input type="checkbox"/>
Semester	fourth	
Qualification	Computer Engineering	
Scientific Title	Ass.Prof	
ECTS (Credits)	6	
Module type	Prerequisite <input type="checkbox"/>	Core <input checked="" type="checkbox"/> Assist. <input type="checkbox"/>
Weekly hours	4	
Weekly hours (Theory)	(2)hr Class	(2)Total hrs workload
Weekly hours (Practical)	(2)hr Class	(2)Total hrs Workload
Number of Weeks	15	
Lecturer (Theory)	Ass.Prof.Dr. Bzar Khidir hussan	
E-Mail & Mobile NO.	Bzar.hussan@epu.edu.iq	
Lecturer (Practical)	Ms. Kurdistan Ms.Mhamad nabi	
E-Mail & Mobile NO.		
Websites	Course: Computer Architecture (epu.edu.iq)	

Course Book

<p>Course Description</p>	<p>Course overview:</p> <ul style="list-style-type: none"> ✓ This course provides students with a solid understanding of fundamental architectural techniques used to build today's high-performance processors and systems. ✓ Computer architecture is concerned with the structure and behavior of the various functional modules of the computer; and how they interact to provide the processing needs of the user. In particular, ✓ this course covers computer systems ranging from PCs through multiprocessors with respect to hardware design and instruction set architecture. ✓ This includes units and related technologies such as primary and secondary memory, caches, central processing unit (CPU), and pipelines. A menu of "possibilities" will be presented, analyzed, and evaluated based on the technology available today. In no event should it be assumed that the architecture that looks the strongest today will be the best in the new millennium? 				
<p>Course objectives</p>	<ul style="list-style-type: none"> ✓ Describe the basic components of the CPU ✓ Understand the roles and purpose of each component of the CPU in computation ✓ Relation between hardware design and instruction set architecture. ✓ Learn assembly language programming. ✓ Identify computers' major components and study their functions. ✓ Introduce hardware design issues of modern computer architectures. ✓ Build the required skills to read and research the current literature in computer architecture. 				
<p>Student's obligation</p>	<p>Student's obligation in the Computer architecture course is:</p> <ul style="list-style-type: none"> ✓ I expect the student to come to class, study the materials and textbook and do the homework, activities, and exams. It is the student's responsibility to check what we covered in class and the announcements during class if he or she did not attend. The best way of learning Computer Architecture is by practicing it. You can acquire a good knowledge level by doing all examples from the textbook. The course is very time demanding. Plan ahead all your activities and if you have any problem with your homework or your study, do not hesitate to ask questions to the Instructor. ✓ You are encouraged to discuss problems with others and to work them out on the whiteboard, but when you sit down to write or code up your solution you must work on your own, without any further interaction. ✓ You are not allowed to share your solutions (literal code and theory solutions) with other students. 				
<p>Required Learning Materials</p>	<ol style="list-style-type: none"> 1. Laptop + Projector 2. lectures with slides and videos 3. Whiteboard 				
<p>Evaluation</p>	<p>Task</p>		<p>Weight (Marks)</p>	<p>Due Week</p>	<p>Relevant Learning Outcome</p>
	<p>Paper Review</p>				
	<p>Assi</p>	<p>Homework</p>	<p>5</p>	<p>2</p>	<p>homework is to allow students to practice beyond the classroom, improve student achievement, and</p>

				to improve students' standardized test results.
	Class Activity	2	10	Learning measurable statements that articulate at the beginning what students should know, be able to do, learning activities enable students to develop the knowledge and skills in the learning outcomes and prepare for formal assessments. activities help teachers and students determine whether, and to what extent, the outcomes have been achieved. As teachers know, students tend to focus on what they think will be assessed.
	Report	5	2	individuals get to understand a specific area based on the information presented in a report. how you deal with these problems determines whether you'll grow and thrive or fail miserably and will understand the problems that they are facing and come up with effective
	Seminar			
	Essay			
	Project	5		Generally, projects are initiated to deal with a particular outcome. A problem or opportunity has been identified and the project has been established to provide a solution. The objective is that the outcome will be achieved and the problem resolved or the opportunity taken.
	Quiz	8		
	Lab.	10		
	Midterm Exam	25	1	
	Final Exam	40	1	
Total	100			

Specific learning outcome:	<p>The course will give the fundamental knowledge and practical abilities in the following:</p> <ul style="list-style-type: none"> • Relation between hardware design and instruction set architecture. • Learn assembly language programming. • Identify computers' major components and study their functions. • Introduce hardware design issues of modern computer architectures. • Build the required skills to read and research the current literature in computer architecture. • Evolution and development of computers 	
Course References:	<ul style="list-style-type: none"> • Computer Architecture, A.P.Godse, D.A.Godse • "Computer Organization," by Carl Hamacher, Zvonko Vranesic and Safwat Zaky. Fifth Edition • Computer Organization and Architecture by "William Stallings" • The 80x86 IBM PC and Compatible Computers by Muhammad Ali Mazidi and Janice Gillispie Mazidi. • Computer Architecture a Quantitative Approach, by Hensly and Patterson (5th Edition) 	
Course topics (Theory)	Week	Learning Outcome
Explaining Syllabus and Introduction to Computer Architecture	1	learn how computing systems are structured. We mainly focus on the processor, cache, memory, and system buses.
<ul style="list-style-type: none"> ✓ Computer Level Hierarchy. ✓ Von-Neumann MODEL, Functional Units, Input Unit Memory. Arithmetic and Logic Unit(ALU)), Control and Output Unit. 	2,3	Learners will find out about von Neumann and his theories that form the basis of modern computer architecture and Learn the fundamental architecture upon which nearly all digital computers have been based—has a number of characteristics: These characteristics include a single, centralized control, housed in the central processing unit, and a separate storage area, primary memory.
CPU: Introduction, Characteristic Study, Process Study, 8086 Microprocessor Study in detail.	3-4	Understand the representations used for numbers and text, computer arithmetic, the functions of the components of a CPU
CPU- ADDRESSING MODES	5	The addressing mode is the method to specify the operand of an instruction. The job of a microprocessor is to execute a set of instructions stored in memory to perform a specific task
Bus Systems: Data Bus, Address Bus, Control Bus, Single Bus Structure, Multiple Bus Structure,	6-7	Understanding how transfers data between components inside a computer, or between computers. This expression covers all

		related hardware components (wire, optical fiber, etc.) and software, including communication protocols
Multiprocessing, Flynn's Taxonomy and Parallel processing	8	Learn Flynn's Classification in which refers to a classification of parallel computer architectures. Gain a basic understanding of fundamental concepts in parallel computing. Be able to identify and leverage common parallel computing patterns. Be able to properly assess the efficiency and scalability of a parallel algorithm/application. Become proficient in using at least one parallel programming technique, and familiar with several others
Memory System Chapter: Cache Memory, internal memory, External Memory	9-10	Understand how main memory is organized and stated and understand memory hierarchy design, memory access time formula, performance improvement techniques, and trade-offs.
I/O Units, External Devices, Interfaces.	11	Understand Input and output: device types and characteristics, controllers, ports, programmed I/O, interrupts, DMA
Pipelining system,	12	Learn the concept of the pipeline (segmentation) and the concepts associated with latency and throughput and limitations of pipelining and causes of loss of productivity and learn general competence, the basic construction and use of parallel computers, the content and use of the terminology for how one measures the performance of parallel algorithms and parallel computers,
Practical Topics	Week	Learning Outcome
Introduction to 8086 Microprocessor	1	
Operand types, Necessary Notes	2-3	
Data Movement Introduction	4	
Arithmetic Instructions	5	
Logical Instructions	6	
String Primitive Instruction	7-8	

I/O Instructions	9-10	
Interrupt Instructions	11	
Rotate & Shift Instructions	12	

Questions Example Design;

Q/ define: Cache Memory, Arithmetic and Logic unit

Q / What are segment registers and their uses?

Q/ Draw Internal Architecture of Intel 8086 Microprocessor?

Q Multiple choices:

1. A 32-bit microprocessor has a word length equal to :

a) 8 byte b) 2 byte c) 4 byte

2. A group of bits that tell the computer to perform a specific operation is known as

(A) Instruction code. (B) Micro-operation. (C) Accumulator. (D) Register.

External Evaluator

Dr. Shahab Wahhab Kareem

