

Kurdistan Region Government Ministry of Higher Education and Scientific Research Erbil Polytechnic University



# Module (Course Syllabus) Catalogue

### 2023-2024

College/ Institute	Khabat Technical Ins	titute			
Department	Department of Information Technology				
Module Name	Computer Organizati	on and Logic Designs			
Module Code	COL105				
Degree	Technical Diploma	✓ Bachelor			
	High Diploma 📃 M	Iaster   PhD			
Semester	1 <sup>st</sup>				
Qualification	Master's Degree in So	oftware Engineering			
Scientific Title	Assistant Lecturer				
ECTS (Credits)	6				
Module type	Prerequisite Cor Assis				
Weekly hours	4				
Weekly hours	(2) hr Class	(55) Total hrs Workload			
(Theory)					
Weekly hours	(2) hr Class	(95) Total hrs Workload			
(Practical) Number of Weeks	12				
Lecturer (Theory)	Ahmed HURMZI				
E-Mail					
Lecturer	<u>ahmad.khdr@epu.edu.iq</u> Mrs. Sulav Ibrahim Sarhan				
(Practical)	Mrs. Nura Ahmed Or				
E-Mail		Ivirs. Inura Anmed Omer			
Websites	https://academicstaff.	epu.edu.iq/faculty/ahmad.khdr			

## **Course Book**

Student's obligation       Course objectives       It is course covers the basic principles of computer organization, operation and performance. It also deals with embedded systems, peripheral devices, memory management, and processor family evolution patters. The course discusses the role of pipelining and multiple functional units in processor design.         Additional there are some main objects related to studying this course:       1       To become familiar in following topics:         2       1. To become familiar in following topics:       2       1         3       How to analyze the system performance.       3         4       Concepts behind advanced pipelining techniques.       3         5       The urrent state of at in memory system design       6         6       How 100 devices are being accessed and its principles.       7         7       To provide the knowledge on Instruction Level Parallelism To impart the knowledge on Nano programming.         9       Nassignments:       1         1       Attendance Policy:       Students are expected to attend each class for the entire semester. Students are responsible for material present in lectures. Only students with official absence, family crises, and illess are excused from class. The student who misses 10 percent of the classes will be placed on probation.         8       Cuterus all stain during all those days when the examination was anomored.       1         10       3.5       1       1	Course Description	Computer Architecture and Organization is the study of internal working, structuring and implementation of a computer system. Architecture in computer system, same as anywhere else, refers to the externally visual attributes of the system. Externally visual attributes, here in computer science, mean the way a system is visible to the logic of programs (not the human eyes!). Organization of computer system is the way of practical implementation which results in realization of architectural specifications of a computer system.						
Course objectives       1. To become familiar in following topics:         2. How Computer Systems work & its basic principles         3. How to analyze the system performance.         4. Concepts behind advanced pipelining techniques.         5. The current state of art in memory system design         6. How I/O devices are being accessed and its principles.         To provide the knowledge on Instruction Level Parallelism To impart the knowledge on Nano programming.         1. Assignments:         In their academic semester, students are obliged to take midterm and final exams, do 8 quizzes, give 2 presentations, writing 4 reports and solving 6 home works as their assignments.         Student's obligation         3. Attendance Policy:         Students are expected to attend each class for the entire semester. Students are responsible for material present in lectures. Only students with official absence, family crises, and illness are excused from class. The student who misses 10 percent of the classes will be placed on probation.         3. Make up Policy:         Since all examination are announced in advance, ZERO grade will be given to any missed examination unless a student has an acceptable reason, such as illness, for not being able to take the examination during all those days when the examination was announced.         Required Learning Materials       lecture halls with data show equipment for lecture presentations, white board, overhead projector, Padlet, Moodle, email, and Viber group (if necessary).         Paper Review       Null       Null		It als proce	so deals with embed ssor family evolution	ded systems, per patterns. The court	ripheral dev	ices, memory management, and		
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Lab.NullMidterm Exam24	Evaluation	signments	Seminar Essay	Null 6	Null Null			
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Final Exam 40 13	Evaluation	signments	Seminar Essay Project Quiz	Null 6 10 8	Null Null Null 3,6,9,12			
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Total     100     Null	Evaluation	signments	Seminar Essay Project Quiz Lab. Midterm Exam	Null         6           10         8           Null         24	Null           Null           Null           3,6,9,12           Null           7			

Specific learning outcome:	<ul> <li>To provid</li> <li>To give a</li> <li>To familia</li> <li>To apply</li> <li>To create</li> <li>To design</li> <li>To deal w</li> <li>To identif</li> <li>To develoc computer</li> </ul>	uce basic principles of computer organization and architecture. le examples of different processors and instruction sets. basis for understanding issues of computer operation and performance. arize the students with computer arithmetic. the knowledge of performance metrics to find the performance of systems. an assembly language program to program a microprocessor system. a hardware component for an embedded system with different types of computers fy high performance architecture design fy the problems in components of computer. op independent learning skills and be able to learn more about different architectures and hardware.
		& use the new technologies in computers. e knowledge of micro programming in the field of speech processing.
Course References:	Key Refere • Weekly la • Computer • Digital El Useful refe • Fundamer • Schaum's Magazines • http://ww • http://elec	ences ecture slides r Organization and Architecture, William Stallings, 5th Edition, 2000 ectronics, William Kleitz, 9th Edition
Practical Topics	Week	Learning Outcome
Introduction to Computer		Why Study Computer Organization & Architecture
Organization & Architecture	1	• Brief History about Computer Generation
Number System	2,3	<ul> <li>Introduction to number System</li> <li>Conversion among numbering System</li> <li>Arithmetic operation of binary number system</li> </ul>
Digital System	4,5	<ul><li>Introduction to Digital System &amp; Logic gates</li><li>Boolean algebra and its Simplification Techniques</li></ul>
Karnaugh Maps	6	<ul><li>Introduction</li><li>Rules of Simplification &amp; Examples</li></ul>
Digital Circuits	7	<ul><li>Combination circuits</li><li>Adder &amp; Subtraction, Decoder &amp; Multiplexers</li></ul>
ContinueDigital Circuits	8	<ul> <li>Sequential Circuits</li> <li>Flip-Flops</li> <li>Register &amp; Counters</li> <li>Memory organization and storage system</li> </ul>
Assembly Language	9	<ul> <li>Introduction</li> <li>ASCII code</li> <li>Conversion text</li> <li>Addressing data items in memory</li> </ul>
Computer Architecture The VON NEUMANN MODEL	10	<ul> <li>Functional unit</li> <li>Input Unit Memory</li> <li>Unit Arithmetic &amp; Logic Unit (ALU)</li> <li>Output Unit Control Unit</li> </ul>
Basic Operational Concept	11	Introduction     Bus Instruction
СРИ		<ul> <li>Data Bus, Address Bus &amp; Control Bus</li> <li>Introduction</li> <li>Characteristic Study &amp; Process</li> </ul>

Practical Topics	Week	Learning Outcome
Registers and counters.	1,2	Introduction to OR, AND, NOT gates
Program Debugging instruction – Trace commands.	3,4	Trace commands.
Data Movement Instructions – MOV PUSH/POP	5	MOV PUSH/POP
Arithmetic Instructions – ADD/ADC/INC SUB/SBB/DEC MUL/IMUL DIV/IDIV.	6	Arithmetic Instructions
Logical Instructions – AND/OR/XOR/NOT/Test and bit test.	7,8	Logical Instructions
String Primitive Instructions.	9	String Primitive Instructions
Program Control Instructions CALL/RET/JMP Conditional Jump.	10	Program Control Instructions
I/O Instructions - IN and OUT Interrupt Instructions – INT.	11	Interrupt Instructions – INT.

### **Questions Example Design**

#### 1. Compositional:

**Q/** Simplify this Boolean function to a minimum number of literals. F = (A + B). (A + B)

Solution:

$$(A + B). (A + B) = A.A + A.B + A.B + B.B$$
  
=  $A + A.B + A.B + B.B$   
=  $A.B + A.B + A.B + 0$   
=  $A. (1 + B + B)$   
=  $A. (1 + B)$   
=  $A. 1$   
=  $A$ 

Q/ Convert the decimal number (112.7) to:

1- Binary number

2- Octal number

3- Hexadecimal number

Solution:

#### 1- Converting to Binary Number

#### a) Real Part

b) Fraction Part

Dec No.÷2	Result	Remainder	Dec No.×2
112÷2	56	0	0.7×2
56÷2	28	0	0.4×2
28÷2	14	0	0.8×2
14÷2	7	0	0.6×2
7÷2	3	1	
3÷2	1	1	
1÷2	0	1	

Dec	Result	Carry	
No.×2			
0.7×2	1.4	1	
0.4×2	0.8	0	
0.8×2	1.6	1	
0.6×2	1.2	1	
		•	

 $(112.7)_{10} = (1110000.1011)_2$ 

#### 2- Converting to Octal Number

#### a) Real Part

Dec No.÷8	Result	Remainder
112÷8	14	0
14÷8	1	6
1÷8	0	1

#### b) Fraction Part

Dec No.×8	Result	Carry
0.7×8	5.6	5
0.6×8	4.8	4
0.8×8	6.4	6
0.4×8	3.2	3

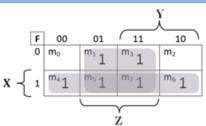
 $(112.7)_{10} = (160.5463)_8$ 

#### 3- Converting to Hexadecimal Number

	a) Real Part			b) Fraction Part		
	Dec No.÷16	Result	Remainder	Dec	Result	Carry
				No.×16		
	112÷16	7	0	0.7×16	11.2	11=B
	7÷16	0	7	0.2×16	3.2	3
				0.2×16	3.2	3
(112.7)1	<sub>0</sub> = (70.B33)					

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Q/ Simplify the following Boolean expression function by using Karnaugh Map: $F = \sum_{i=1}^{n} (1,3,4,5,6,7)$	)
Solution:	



Final Solution: F=X+Z

#### 2. True or false type of exams:

- 1- The Boolean expression for a tow input AND gate equal  $to(F = \overline{AB}, (True))$
- 2- Slide Rule is inventoried by John Napier.(False)
- 3- The Full adder is a combinational circuit that performs the addition of two bits. (False)
- 4- A Registers holds a single bit of memory. (True)
- 5- First Electronic digital computer, was called (Mark1), build in 1964. (False)
- 6- Keyboard for input and monitor for output, first time used in 3rd generation. (True)

3. Multiple choices:
1- Slide Rule is inventoried by
a. John Napier
b. William Oughtred
c. Ada Lovelace
d. George BOOLE
2- The Main Memoryis used in the 2 <sup>nd</sup> generation.
a. Punched Card
b. PROM & DRAM
c. RAM & ROM
d. EPROM & SRAM
3- Major Innovation using to designed computer in the 3 <sup>rd</sup> generation, it's
a. Transistors
b. Integrated circuit
c. Vacuum Tubes
d. LSIC and VLSIC
4- This Binary number (10101010101101111.11) is equal to Hexadecimal number.
a. EA378.C
b. 352158.3
c. 1D46F.C
d. 1556F.C
5that is the mathematics of variables with values that can be only "True" or "False".
a) Boolean Logic
b) ENIAC
c) ABACUS
d) Pascal Machine

### Extra notes:

Ask questions, Respect and listen to your classmates, and the teacher, Raise your hand to speak, Be prepared for class, Be quiet when the teacher and your classmates are talking, Share new ideas, Respect others' property, Keep your workspace tidy, Be kind, Always do your best, Be a good friend, Be on time, Share with others, Use equipment properly, turn in your homework on time, Use positive language, Listen with your ears and your eyes, Contribute to discussions, Be respectful of others' ideas, Follow the teacher's directions, Cooperate with your classmates, Be creative, Be honest, Use technology appropriately, Be proud of your work

#### **External Evaluator**

As a participant I supported and reviewed the curriculum of the course book and I see It suitable for the first graders and it is quite academic and at the level of the institute