Ministry of Higher Education and
Scientific Research - Iraq
Al-Furat Al-Awsat Technical University
Al-Musaib Technical College
Department of Electrical Engineering Techniques

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	**MICROPROCESSOR**	**Module Delivery**	
Module Type	CORE	✓ **Theory** **Lecture** ✓ **Lab** **Tutorial** ✓ **Practical** ✓ **Seminar**	
Module Code	ATU23055		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	٣	**Semester of Delivery**	1
Administering Department	**DEPARTMENT OF ELECTRICAL ENGINEERING TECHNIQUES**	**College**	**AL-FURAT AL-AWSAT TECHNICAL UNIVERSITY/AL-MUSAIB TECHNICAL COLLEGE**
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	None	**e-mail**	None
Review Committee Approval	14/06/2023	**Version Number**	1.0

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	The course objective is to introduce the operation, programming, and application of microprocessor
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Analyze the functional block of the 8086 microprocessors. 2- Write an assembly language program for the given problem. 3- Use instructions for different addressing modes. 4- Develop an assembly language program using assembler.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: • Part A – Introduction to Microcomputers. Introduction to Microcomputers; Microprocessor vs. Microcontrollers. Introduction to Microprocessor-Based System Design. Microprocessor Memories, Memory Operation

	Microprocessor System, Need for memory segmentation, Microprocessor Architecture, Bus Interfacing Unit (BIU), Execution Unit (EU). Addressing Modes, Assembly language, Mnemonics, Assembler program Different Instruction Types, Data Transfer, Shift Instruction, Examples The Programmable Peripheral Interface (PPI). [20 hrs] • Part B Programmable logic controller (PLC). Programmable logic controller (PLC), Advantages of PLC, Architecture of PLC, Mechanical design of PLC How does a PLC operate? What are input/output devices Programming Language for PLC, Ladder Logic, Functional block diagram (FBD), Instruction list Examples on Programming PLC [10 hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	1-**Hands-on Experiments:** Engage students in practical experiments to deepen their understanding of the operation, programming, and application of microprocessor. 2-**Simulation Software:** Simulation Software: Use proteus software for virtual circuit design and programming based on a microprocessor. 3-**Problem-solving Exercises:** Include various problem-solving exercises for programming and the application of microprocessor techniques. 4-**Group Projects:** Assign collaborative projects for programming, and application of microprocessors. 5-**Real-world Applications:** Discuss practical applications of microprocessors in different devices and systems. 5-**Interactive Discussions:** Encourage student participation and critical thinking through open-ended questions. 6-**Conceptual Understanding:** Focus on intuitive understanding alongside mathematical analysis. 7-**Assessment Variety:** Use diverse assessment methods to gauge student understanding. 8-**Office Hours and Support:** Offer individualized assistance through office hours or online support.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome

Formative assessment	**Quizzes**	4	10% (10)	2, 12	LO # 3, and 4
	Assignments	8	10% (10)	2, 12	LO # 3, and 4
	Projects / Lab.	7	10% (10)	2, 12	LO # 2, and 4
	Report	8	10% (10)	2, 12	All
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	LO # 1-4
	Final Exam	3 hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
١,٢	• **Introduction to Microcomputers; Microprocessor vs. Microcontrollers. Introduction to Microprocessor-Based System Design.**
٣,٤	**Microprocessor Memories, Memory Operation, Read Only Memories (ROM), RAM Architecture, Dynamic RAM structure and operation**
٥	**Microprocessor System, Need for memory segmentation, Microprocessor Architecture, Bus Interfacing Unit (BIU), Execution Unit (EU), Segment Group:, DATA Group Registers**
٦,٧	**Addressing Modes, Assembly language, Mnemonics, Assembler program,**
٨,٩	**Different Instruction Types, Data Transfer, Shift Instruction, Examples**
١٠	**The Programmable Peripheral Interface (PPI)**
١١	**Programable logic controller (PLC), Advantages of PLC, Architecture of PLC, Mechanical design of PLC**
١٢	**How does a PLC operate? What are input/output devices?**
١٣,١٤	**Programming Language for PLC , Ladder Logic, Functional block diagram (FBD), Instruction list, Examples on Programming PLC**
١٥	• **Final Examination**

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
١	**Lab ١: Identify various pins of the given Microprocessor.**
٢	**Lab ٢: Use Assembly Language Programming Tools and functions**
٣	**Lab ٣: Use different addressing mode instruction in program** **Write an Assembly Language Program (ALP) to add two given ٨ and ١٦ bits numbers** **Write an Assembly Language Program (ALP) to subtract two given ٨ and ١٦ bits numbers**
٤	**Lab ٤: (a) Write an Assembly Language Program (ALP) to multiply two given ٨ and ١٦ bits unsigned numbers** **(b)Write an Assembly Language Program (ALP) to multiply two given ٨ and ١٦ bits signed numbers**
٥	**Lab ٥: (a) Write an Assembly Language Program (ALP) to divide two given ٨ and ١٦ bits unsigned numbers** **(b)Write an Assembly Language Program (ALP) to divide two given ٨ and ١٦ bits signed numbers**
٦	**Lab ٦: Write an Assembly Language Program (ALP) to add, subtract, multiply, and divide two BCD numbers.**
٧	**Lab ٧: Implement loop in assembly language program**

	Write an Assembly Language Program (ALP) to sum of series of Hexadecimal numbers. **(b) Write an Assembly Language Program (ALP) to sum of series of BCD numbers.**
٨	**Lab ٨: (a) Write an Assembly Language Program (ALP) to find the smallest number from an array of n numbers.** **(b)Write an Assembly Language Program (ALP) to find the largest number from an array of n numbers**
٩	**Lab ٩: (a) Write an Assembly Language Program (ALP) to arrange numbers in an array in ascending order.** **(b)Write an Assembly Language Program (ALP) to arrange numbers in an array in descending order.**
10	**Lab ١٠: (a) Write an Assembly Language Program (ALP) to arrange elements string in reverse order.** **(b) Write an Assembly Language Program (ALP) to find string length.**
11	**Lab ١١: (a) Write an Assembly Language Program (ALP) to check whether a given number is an ODD or EVEN.** **(b) Write an Assembly Language Program (ALP) to count ODD and/or EVEN numbers in an array.**
12	**Lab ١٢: (a) Write an Assembly Language Program (ALP) to check whether a given number is a POSITIVE or NEGATIVE.** **(b) Write an Assembly Language Program (ALP) to count POSITIVE and/or NEGATIVE numbers in an array**
13	**Lab ١٣: (a) Write an Assembly Language Program (ALP) to count the number of '١' in a given number.** **(b) Write an Assembly Language Program (ALP) to count the number of '٠' in a given number.**
14	**Lab ١٤: Review**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Hall, Douglas V. MICROPROCESSORS AND INTERFACING. 1992.	Yes
Recommended Texts	Walter A. Triebel, Avtar Singh. The ٨٠٨٨ and ٨٠٨٦ Microprocessors: Programming, Interfacing, Software, Hardware, and Applications (٤th Edition) - Instructor's Solution Manual [٤th ed.] ٠١٣٠٩٣٠٨١٤, ٩٧٨٠١٣٠٩٣٠٨١١. Prentice Hall ٢٠٠٢	No

Websites	Assembly_Programming https://www.tutorialspoint.com/assembly_programming/index.htm

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (٥٠ - ١٠٠)	**A** - Excellent	امتياز	٩٠ - ١٠٠	Outstanding Performance
	B - Very Good	جيد جدا	٨٠ - ٨٩	Above average with some errors
	C - Good	جيد	٧٠ - ٧٩	Sound work with notable errors
	D - Satisfactory	متوسط	٦٠ - ٦٩	Fair but with major shortcomings
	E - Sufficient	مقبول	٥٠ - ٥٩	Work meets minimum criteria
Fail Group (٠ – ٤٩)	**FX** – Fail	مقبول بقرار	(٤٥-٤٩)	More work required but credit awarded
	F – Fail	راسب	(٠-٤٤)	Considerable amount of work required

Note:

NB Decimal places above or below ٠,٥ will be rounded to the higher or lower full mark (for example a mark of ٥٤,٥ will be rounded to ٥٥, whereas a mark of ٥٤,٤ will be rounded to ٥٤. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.