

Microprocessors and Microcontrollers Course Definition Form

1- Basic Information:

Course Name	Microprocessors and Microcontrollers
Course ID	CEE307
Contact Hours (Registered Sessions)	30
Contact Hours (Synchronized Sessions)	18
Mid Term Exam	There is no
Exam	1.5
Registered Sessions Work Load	30
Synchronized Session Work Load	18
Credit Hours	5

2- Pre-Requisites:

Course	ID
Digital Electronics	CEE204
Introduction to Programming	IPG101

3- Course General Objectives:

This course aims to introduce the architecture of microprocessors and its internal components and how they work. We study in this course the Microprocessors Intel 8086 in order to explain the basic notions in the domain of microprocessors, and to clarify how the microprocessor is connected to peripheral circuits which are necessary in most applications like memories and input-output ports. This course presents an introduction to programming in assembly language in order to understand how programs work and the direct relationship between software structure and hardware architecture like interrupts mechanism. This is in addition to the introduction of some programming techniques in assembly in order to understand the execution mechanism programs written in high level languages. Then we study the basic notions in the domain of microcontrollers and the similar and different points with microprocessor. This presents an introduction to embedded systems. This study is explained by focusing on the architecture of the Intel 8051 microcontroller and its peripherals. Finally, we explore some famous families of modern microprocessors and microcontrollers in order to familiarize the student with modern devices.



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4- Intended Learning Outcomes (ILO):

Code	Intended Learning Outcomes			
ILO1	Understanding the general architecture of microprocessor based systems.			
ILO2	Understanding the internal structure of Intel 8086 microprocessor and its main components.			
ILO3	Understanding the basic principle to connect peripherals using addressing and data buses.			
П 04	Recognizing different addressing modes, methods of describing the algorithms and the			
ILU4	methodology of writing programs.			
II 05	Recognizing the assembly instructions and programming techniques in order to write simple			
programs in assembly.				
ILO6	Understanding sub-program execution mechanism.			
ILO7	Understanding interrupts mechanism in 8086 microprocessor.			
ILO8	Recognizing the microcontroller and the architecture of 8051 microcontroller.			
ILO9	Recognizing assembly instructions of 8051 microcontroller.			
ILO10	Understanding interrupts in 8051 microcontroller.			
ILO11	Understanding the asynchronous serial transmission and programming the Baud Rate.			
ILO12	Recognizing some modern families of microprocessors and microcontrollers.			

5- Course Syllabus (18 hours of total synchronized sessions)

• RS: Recorded Sessions; SS: Synchronized Sessions;

ILO	Course Syllabus	RS	SS	Туре	Additional Notes
	Introduction to Microprocessors				
	 What is the Microprocessor 			Exercises	
	• Microprocessor based systems			□ Assignments	
II O1	• What is inside the Microprocessor			□ Seminars	
ILUI	Control Unit			□ Projects	
	• Brief history of the Microprocessor			□ Practices	
	 Criteria of choosing the 			□ Others	
	Microprocessor				
	8086 Architecture			Exercises	
поз	• Feature of 8086 Microprocessor			□ Assignments	
	Architecture			□ Seminars	
	• Bus Signals			□ Projects	

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		ctices

			$\Box \text{Practices}$
	Input Output Dovigos		
	Programmable input-output		Exercises
	operations		□ Assignments
ILO3	Programmable input-output		
	circuits		\Box Projects
	Programmable Interrupt Controller		\Box Practices
	Programmable Timer		□ Others
	Introduction to the Assembly		🗵 Exercises
	Programming Languages		□ Assignments
пол	 Sector-based Addressing 		□ Seminars
ILO4	 Addressing Modes 		\Box Projects
	• Developing Programs in Assembly		\Box Practices
			Others
-	Programming Techniques in		
	Assembly		Exercises
	Solution Temperature control		□ Assignments
11.05	program		□ Seminars
ILO3	 Arithmetic Instructions 		\Box Projects
	 Jump Instructions 		
	• Loops		Others
	Macro Instructions		
	Subprograms and procedures		
	 Procedures operation 		🗷 Exercises
	Call Instruction		□ Assignments
II O6	Return Instruction		□ Seminars
ILU0	Stack using in subprograms		\Box Projects
	Near Call December passing to /from		
	• Parameter passing to/mom		Others
	• Far call		
	Interrupts in 8086 Microprocessor		Exercises
	Interrupt operation		□ Assignments
ILO7	Microprocessor response for		□ Seminars
	Mode-0 interrupt		\Box Projects
	Interrupt Modes		□ Practices

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8051 Microcontroller Image: Second Secon				Others	
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• Modern Microprocessors	ILO12	 Modern Microprocessors 		Projects	
Modern Microcontrollers Description Practices		 Modern Microcontrollers 		Practices	
Digital Signal Processors Others		 Digital Signal Processors 		Others	



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6- Assessment Criteria (Related to ILOs)

ISC	Interactive Synchronized Collaboration	Ex	Exams		Rpt	Reports
PF2F	Presentations and Face-to-Face Assessments	PW	Practice Wo	rk		

ЩО		Intended		Asse	essmen	t Type	
Code	ILO	Results	ISC	PW	Ex	PF2F	Rpt
IL01	Understand the general architecture of microprocessor based systems.		X		Х		
ILO2	Understand the internal structure of Intel 8086 microprocessor and its main components.		X		Х		
ILO3	Understand the basic principle to connect peripherals using addressing and data buses.		X		Х		
ILO4	Introduce different addressing modes, methods of describing the algorithms and the methodology of writing programs.		X		X		
ILO5	Introduce the assembly instructions and programming techniques in order to write simple programs in assembly.		X		X		
ILO6	Understand sub-program execution mechanism.		Х		Х		
ILO7	Understand interrupts mechanism in 8086 microprocessor.		X		Х		
ILO8	Introduce the microcontroller and the architecture of 8051 microcontroller.		X		Х		
ILO9	Introduce assembly instructions of 8051 microcontroller.		X		Х		
ILO10	Understand interrupts in 8051 microcontroller.		X		Х		
ILO11	Understand the asynchronous serial transmission and programming the Baud Rate.		X		X		
ILO12	Introduce some modern families of microprocessors and microcontrollers.		X		X		

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7- Practice Tools:

Tool Name	Description

8- Main References

1-	N. Sheik Obeid and others, "Microcomputer structure and microprocessors", Damascus University,
	Damascus, 1999.
2-	S. K. Sen, "Understanding 8085/8086 Microprocessor and Peripheral ICs", New Age Publications
	(Academic), 2009

 3- Kenneth J. Ayala, "The 8051 Microcontroller Architecture, programming and applications", West Publishing Company, 1991.

9- Additional References