

Syrian Arab Republic	 الجامعة الافتراضية السورية SYRIAN VIRTUAL UNIVERSITY	الجمهورية العربية السورية
Ministry of Higher Education		وزارة التعليم العالي
Syrian Virtual University		الجامعة الافتراضية السورية

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.

Syrian Arab Republic	 الجامعة الافتراضية السورية SYRIAN VIRTUAL UNIVERSITY	الجمهورية العربية السورية
Ministry of Higher Education		وزارة التعليم العالي
Syrian Virtual University		الجامعة الافتراضية السورية

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.
ILO4	Recognizing different addressing modes, methods of describing the algorithms and the methodology of writing programs.
ILO5	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	Type	Additional Notes
ILO1	Introduction to Microprocessors <ul style="list-style-type: none"> • What is the Microprocessor • Microprocessor based systems • What is inside the Microprocessor • Control Unit • Brief history of the Microprocessor • Criteria of choosing the Microprocessor 			<input checked="" type="checkbox"/> Exercises <input type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	
ILO2	8086 Architecture <ul style="list-style-type: none"> • Feature of 8086 Microprocessor • Architecture • Bus Signals 			<input checked="" type="checkbox"/> Exercises <input type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects	

Syrian Arab Republic	 الجامعة الافتراضية السورية SYRIAN VIRTUAL UNIVERSITY	الجمهورية العربية السورية
Ministry of Higher Education		وزارة التعليم العالي
Syrian Virtual University		الجامعة الافتراضية السورية

				<input type="checkbox"/> Practices <input type="checkbox"/> Others	
ILO3	Input-Output Devices <ul style="list-style-type: none"> • Programmable input-output operations • Programmable input-output circuits • Programmable Interrupt Controller • Programmable Timer 			<input checked="" type="checkbox"/> Exercises <input type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	
ILO4	Introduction to the Assembly <ul style="list-style-type: none"> • Programming Languages • Sector-based Addressing • Addressing Modes • Developing Programs in Assembly 			<input checked="" type="checkbox"/> Exercises <input type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	
ILO5	Programming Techniques in Assembly <ul style="list-style-type: none"> • Solution Temperature control program • Arithmetic Instructions • Jump Instructions • Loops • Macro Instructions 			<input checked="" type="checkbox"/> Exercises <input type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	
ILO6	Subprograms and procedures <ul style="list-style-type: none"> • Procedures operation • Call Instruction • Return Instruction • Stack using in subprograms • Near Call • Parameter passing to/from procedures • Far call 			<input checked="" type="checkbox"/> Exercises <input type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	
ILO7	Interrupts in 8086 Microprocessor <ul style="list-style-type: none"> • Interrupt operation • Microprocessor response for Mode-0 interrupt • Interrupt Modes 			<input checked="" type="checkbox"/> Exercises <input type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices	

Syrian Arab Republic	 الجامعة الافتراضية السورية SYRIAN VIRTUAL UNIVERSITY	الجمهورية العربية السورية
Ministry of Higher Education		وزارة التعليم العالي
Syrian Virtual University		الجامعة الافتراضية السورية

				Others	
ILO8	8051 Microcontroller <ul style="list-style-type: none"> • Microcontroller and Microprocessors • 8051 Architecture 			<input checked="" type="checkbox"/> Exercises <input type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices Others	
ILO9	Programming 8051 Microcontroller <ul style="list-style-type: none"> • Microcontroller Instructions • Programming 8051 Microcontroller 			<input checked="" type="checkbox"/> Exercises <input type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices Others	
ILO10	Interrupts and Timers in 8051 Microcontroller <ul style="list-style-type: none"> • Interrupts • Timer 			<input checked="" type="checkbox"/> Exercises <input type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices Others	
ILO11	Serial Port in 8051 Microcontroller <ul style="list-style-type: none"> • Serial Communication • Serial Port in 8051 • Example on Serial Communication 			<input checked="" type="checkbox"/> Exercises <input type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices Others	
ILO12	Modern Microprocessors and Microcontrollers <ul style="list-style-type: none"> • Speed Comparison criteria • Modern Microprocessors • Modern Microcontrollers • Digital Signal Processors 			<input checked="" type="checkbox"/> Exercises <input type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices Others	

Syrian Arab Republic	 الجامعة الافتراضية السورية SYRIAN VIRTUAL UNIVERSITY	الجمهورية العربية السورية
Ministry of Higher Education		وزارة التعليم العالي
Syrian Virtual University		الجامعة الافتراضية السورية

6- Assessment Criteria (Related to ILOs)

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

ILO Code	ILO	Intended Results	Assessment Type				
			ISC	PW	Ex	PF2F	Rpt
ILO1	Understand the general architecture of microprocessor based systems.		X		X		
ILO2	Understand the internal structure of Intel 8086 microprocessor and its main components.		X		X		
ILO3	Understand the basic principle to connect peripherals using addressing and data buses.		X		X		
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.		X		X		
ILO7	Understand interrupts mechanism in 8086 microprocessor.		X		X		
ILO8	Introduce the microcontroller and the architecture of 8051 microcontroller.		X		X		
ILO9	Introduce assembly instructions of 8051 microcontroller.		X		X		
ILO10	Understand interrupts in 8051 microcontroller.		X		X		
ILO11	Understand the asynchronous serial transmission and programming the Baud Rate.		X		X		
ILO12	Introduce some modern families of microprocessors and microcontrollers.		X		X		

Syrian Arab Republic	 الجامعة الافتراضية السورية SYRIAN VIRTUAL UNIVERSITY	الجمهورية العربية السورية
Ministry of Higher Education		وزارة التعليم العالي
Syrian Virtual University		الجامعة الافتراضية السورية

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

--