

Department         Electrical Engineering Department           Program         I2120305           Course Title         Microcontrollers         Course Number:         Spring           Year         2019/2020         Semester:         Spring           Prerequisite(s)         Digital Electronics         Instructor         Dr. Jafar Jallad           Instructor         Dr. Jafar Jallad         Instructor's e-mail         J.Jallad@ptuk.edu.ps           Office Hours         SUN/TUE, THU (9-10)         MON,WED (8-9)         Class Room:         H108           Course description         Microprocessors and microcontroller systems: microprocessors, microcontrollers, memory, input/output, busses (Data, address, control).         Microprocessors, analog to digital converters.         Programming techniques. Subroutines, addressing modes, Examples of and microcontrollers in engineering applications.           Course Intended Learning         A) Knowledge and understanding         1           Outcomes (CILOS)         A) Knowledge and understanding         1           Design an effective electronics circuit based on simulation, components, and sub-system.         2         Apply engineering principles including design, analysis, and validation.           B)         Intellectual/Cognitive skills         1         Design an effective leactronics circuit based on simulation, components, and sub-system.           C Subject specialization	College	Engineering and Technology				
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D) General and transferable skills		<ul> <li>B) Intellectual/Cognitive skills <ol> <li>Design an effective electronics circuit based on simulation, components, and sub-system.</li> <li>Evaluate specifications, define and solve problems.</li> <li>Work effectively as part of a team and learn independently.</li> <li>Organize works and apply project management.</li> </ol> </li> <li>C) Subject specialization and practical skills <ol> <li>Consider and assess a variety of methods and tools in the electronics world.</li> <li>Know state-of-the-art-in this area.</li> </ol> </li> </ul>				

تاريخ الإصدار: 2019/5/12



	<ol> <li>Resolving problems, issues, challenges, and be able to troubleshoot successfully.</li> </ol>				
Textbook(s)	"The PIC Microcontroller and Embedded systems – Using Assembly and C for PIC18," Muhammad Ali Mazidi, Rolin D. McKinlay, and Danny Causey, Prentice Hall, 2007				
Other required material (References):	<ul> <li>(1) Design reference notes and data sheets of Microchips.</li> <li>(2) Lecture notes on Moodle</li> </ul>				
Other Resources used (e.g. e-learning, field visits, periodicals, software, etc. )	Mplab Software, PIC C COMPILIER, PROTEUS SIMULATION.				

## Academic Quality Assurance Department

## Course Syllabus Form

Course Teaching Methods	
Teaching Method	CILOs
Interactive lectures	Knowledge and understanding
Discussion + Problem based learning	Intellectual/Cognitive skills
Tutorials + Simulations	Subject specialization and practical skills
Problem solving	General and transferable skills

Assessment Type	Details/Explanation of assessment in relation to CILOs	Weight	Date(s)
First Exam		30	5 <sup>th</sup> – 7 <sup>th</sup> Week
Second Exam		30	9 <sup>th</sup> – 11 <sup>th</sup> Week
Quizzes			
Assignments			
Project			
Laboratory/Practical			
Final Exam		40	16 <sup>th</sup> Week
Total		100%	

تاريخ الإصدار : 2019/5/12	رقم الإصدار: (1/0)	رمز الوثيقة: د.ج.أ- إ.ب.خ-ن02



Course Intended Learning Outcomes (CILOs)						
<u>CILOs</u>	<u>Mapping to</u> Program ILOs					
On successful completion of the course, students will be able to:	а	b	с	d		
Get the basic knowledge of Microcontroller and Microprocessor.	$\checkmark$					
Get the basic knowledge of different instructions in assembly language.	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		
Get the basic knowledge of different types of memories and addressing modes.	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		
Get the basic knowledge of the architecture of CPU.	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		
Get the basic knowledge of Timers, PWM, ADC.	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		
Get the basic knowledge of Interrupt process in programming.	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		

Course	Course Weekly Breakdown							
Week	Date	Topics Covered	Lab	Assessment				
1		<ul> <li>Introduction: World of Microcontrollers         <ul> <li>✓ Microelectronic systems, microcontrollers and microprocessors in everyday life and in industry. Differences between microprocessors and microcontrollers.</li> <li>Microcontrollers examples, pinout and general features.</li> <li>✓ Architecture of the system. Data ,address and control busses, system clock.</li> </ul> </li> </ul>	A		First Exam			
1		Microcontroller Basics: ✓ Memory: Random access memory (RAM), Read Only memory (ROM), Masked programmed ROM, PROM, EPROM, addressing memory.	A,B,C, D					



	رمز الوثيقة: د.ج.أ- إ.ب.خ-ن02 رقم الإصدار: (1/0) تاريخ الإصدار: 2019/5/12					
		PIC16F87A in assembl communica	serial port programming y and C: Basics of serial ntion, PIC16F87A	A,B,C, D	Final Exa	m
10,11, 12,13		PIC16F87A types and IO program operations conversion accessing PIC16F87A PIC16F87A ✓ PIC1 prog C: Pr time Prog in PI	a programming in C: Data time delay in PIC16F87A, ming in PIC16F87A, Logic in PIC16F87A, Data program in PIC16F87A, code ROM space in , Data serialization using 6F87A Timer ramming in Assembly and rogramming PIC16F87A rs, Counter programming, ramming timers 0 and 1 C16F87A.	A,B,C, D	Second Ex	am
6,7,8,9		<ul> <li>✓ Asse instr Intro asse</li> <li>Asse</li> <li>8051</li> <li>Asse</li> <li>Arith and   call i</li> <li>prog</li> </ul>	mbly programming and uction of PIC16F87A: oduction to PIC16F87A mbly programming, mbling and running an program, Data types and mbler directives, metic, logic instructions programs, Jump, loop and nstructions, IO port ramming.	A,B,C, D		
3,4,5		Special Pur ✓ Inside Micro Proce 8051 Regis Inter 8051 Types Regis Pins 0 Deco With 8051	pose Regester: the Computer, controllers and Embedded essors, Block Diagram of , PSW and Flag Bits, 8051 ther Banks and Stack, nal Memory Organization of , IO Port Usage in 8051, s of Special Function thers and their uses in 8051, Of 8051. Memory Address ding, 8031/51 Interfacing External ROM And RAM. Addressing Modes.	A,B,C, D		
		<ul> <li>✓ Inside interr</li> <li>✓ Instruction</li> <li>Cycle asser</li> <li>✓ Trans</li> <li>Instruction</li> <li>✓ Instruction</li> <li>✓ Instruction<!--</td--><td>e the CPU: Control unit, nal bus, ALU uctions, fetch and execute wwriting to memory, nbler. offer instructions, uctions-branch, mnemonics metical, logical, bit shift, looping, directives, putines, delay.</td><td></td><td></td><td></td></li></ul>	e the CPU: Control unit, nal bus, ALU uctions, fetch and execute wwriting to memory, nbler. offer instructions, uctions-branch, mnemonics metical, logical, bit shift, looping, directives, putines, delay.			

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Polest 1930
The Technical Unit

connection to RS232, PIC16F87Aserial port programming in assembly,serial port programming in assembly,serial port programming inPIC16F87A C.✓ PIC16F87A Interruptprogramming in assembly andC: PIC16F87A interrupts,Programming timer, externalhardware, serialcommunication interrupt,Interrupt priority inPIC16F87A, Interruptprogramming in C.		
Interfacing:LCDinterfacing,Keyboard interfacing.ADC, DAC and sensor interfacing:ADC 0808 interfacing to PIC16F87A,Serial ADC Max1112 ADC interfacingto 8051, DAC interfacing, Sensorinterfacing and signal conditioning.Motor control: Relay, PWM, DC andstepper motor:Relays and optisolators, stepper motor interfacing,DC motor interfacing and PWM.✓PIC16F87A interfacing with8255: Programming the 8255,8255 interfacing, Cprogramming for 8255.	A,B,C, D	
GUI in Matlap One lecture briefing	А	

Prepared by:	Dr. Jafar Jallad	Signature	
Head of Department	Dr. Jafar Jallad	Signature	
Date	2020.2.2		

تاريخ الإصدار: 2019/5/12	رقم الإصدار: (1/0)	رمز الوثيقة: د.ج.أ- إ.ب.خ-ن02

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