



Philadelphia University
Faculty of Engineering, Department of Mechatronics Engineering.
Course Syllabus

Course Title: Microcontroller Laboratory (0640448), Fourth Year.

Prerequisite: Microprocessor and Microcontrollers systems (640328).

Corequisite: Microprocessor and Microcontrollers systems (640328).

Credit Hours: 1-credit hours (16 weeks per semester, approximately 45 contact hours).

Course description: Measurement principles; Analogue signal conditioning; Displacement and Level transducers; Digital transducers; Force and Strain transducers; Temperature transducers; interfacing microcontroller systems with sensors and actuators (DC motors); Programming microcontroller (PIC & Arduino); DC Motor Control; Programming C-Language.

Website: <http://www.philadelphia.edu.jo/academics/ssalah/>

Instructor: Eng. Samer Zaid Sartawi.

Instructor: **Email:** ssalah@philadelphia.edu.jo

Office: Engineering building, room 6411. ext: 2346

Laboratory Outlines:

Week	Exp.#	Experiment Name
1	1	Introduction.
2	2	Micro controller programming part one.
3	3	Micro controller programming part two.
4	4	Analog to Digital converter (ADC) + Liquid Crystal Display (LCD).
5	5	Temperature and light control using PIC.
6	---	Free laboratory.
7	6	Arduino Microcontroller programming part one.
8	7	Arduino Microcontroller programming part two.
9	8	Reading transducers using Arduino part one.
10	9	Reading transducers using Arduino part two.
11	10	DC Motors control Arduino.
12	11	Stepper Motors control Arduino.
13	12	Servo Motors control Arduino.
14	---	Final Exam.

Course Learning Outcomes with reference to ABET Student Outcomes:

Upon successful completion of this Laboratory, student should:

1.	Understanding of microcontroller's architecture (communications, DA, AD and PWM).	[1]
2.	Interface Arduino & PIC Microcontrollers with different sensors and actuators.	[6]
3.	Program and debug microcontroller codes using micro C and Arduino ide soft wares.	[1]
4.	Use Proteus software as simulator for codes and circuits.	[6]
5.	Control actuators using PIC 16F877A and Arduino Mega.	[6]

Assessment Guidance:

Evaluation of the student performance during the semester (total final mark) will be conducted according to the following activities:

Reports: The students should deliver full printed report after finishing the experiment within one week; the delivering is due at the beginning of the class. Late two days report will be graded from half of the total mark. Other late reports(over 2 days) will not be accepted.

Quizzes: 3-quizzes of 10-minutes will be conducted during the semester. The materials of the quizzes are set by the lecturer.

Final Exam: The students will undergo a scheduled final exam at the end of the semester covering the whole materials taught in the course.

Grading policy:

Reports	30%
Quizzes	30%
Final Exam	40%
Total:	100%

Mark Entry Category	Mark
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Lab report (full printed)	20
Total	20

Final Exam Category	Mark
Theoretical part	10
Practical part	30
Total	40

Microcontroller report (Marks distribution):

This table must be printed in the cover page.

Report part	Ideal mark	Your mark
Cover page	0.25	
Objective	0.25	
Theory	0.25	
Apparatus	0.25	
Programming and testing	12	
Conclusion	2	
Total	15	

References Books:

1. Interfacing PIC Microcontroller: Embedded Design by Interactive Simulation by Martin Bates Elsevier 2006.
2. Microcontroller Based Applied Digital Control by Dogan Ibrahim. Wiley 2006.
3. Making PIC Microcontroller Instruments and Controllers by H. Sandhu Mcgrew-Hill, 1st edition 2008.
4. Designing Embedded Systems with PIC Microcontrollers, 2nd Edition: Principles and Applications by Tim Wilmshurst. Newnes. 2nd edition 2009.

References websites:

- <http://www.microchip.com/>
- <http://www.arduino.cc/en/>