



**Course:** Microprocessors and Microcontrollers Lab (0908432) (1 Cr. – Core Course)  
**Lecture Time (Tue: 13:00-16:00 and Wed: 14:00 – 17:00)**

**Instructor:** Eng.Hisham Hatem  
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*Office Hours: (Announced on office door )*

**Course Website:** <http://elearning.ju.edu.jo>

**Catalog Data:** Introduction to embedded systems design tools and hardware programmers. Experiments using both simulation and practical implementation of the basic building blocks of a microcontroller including timers, counters, PWM generation, I/O techniques and requirements, A/D conversion, serial communications. Experiments to explore the system design process using hardware-software co design process. Design project.

**Prerequisites by Course:** Microprocessors and Microcontrollers (0908431) or Concurrently

**Prerequisites By Topic:** Students are assumed to have sufficient knowledge pertaining to the following:  
 1.Digital Logic fundamentals  
 2. Programming with MATLAB.

**Textbook:** Lab Sheets.

**References:**

- *Tim Wilmshurst, Designing Embedded Systems with PIC Microcontrollers: Principles and Applications, Newnes, 2007. Main Textbook.*
- *Tim Wilmshurst, An Introduction to the Design of Small-Scale Embedded Systems,Palgrave, 2001*
- *K. Irvine, Assembly Language for Intel-based Computers 4 Ed., Prentice Hall 2003*

**Schedule & Duration:** 10 Weeks, 18 lectures (100 minutes each), plus exams.

**Minimum Student Material:** Textbook, class handouts, and an access to a personal computer.

**Minimum College Facilities:** Classroom with whiteboard and projection display facilities, library, Microprocessors and Microcontrollers lab equipped with Computers, and Microprocessors and Microcontrollers kits.

**Course Objectives:**

1. Ability to design and construct a complete simple embedded system hardware.
2. Ability to program and interface embedded systems for industrial applications

**ABET SO:**

3) An ability to communicate effectively with a range of audiences

**Course Learning Outcomes and Relation to ABET Student Outcomes:**

Upon successful completion of this course, a student should:

1. Recognize the concept of Embedded System.(1)
2. Perform programming of Microprocessors and Microcontrollers using multiple platforms.(2)
3. Practice the written and oral communication skills in a form of a presentation.(3)

**Course Topics:**

	Topic Description	Hrs
1.	<b>Introduction to Lab</b>	3
2.	<b>Exp.1:- MPLAB Basics (1)-Memory Decoding</b>	3
3.	<b>Exp.2:- MPLAB Basics (2)- Instructions Set Classification</b>	3
4.	<b>Exp.3:- Implementing Instructions (1)- Subroutines (Functions) and Macros</b>	3
5.	<b>Exp.4:- Implementing Instructions (2)-EEPROM Handling</b>	3
6.	<b>Exp.5:- Basic Programming-Bottle labeling and packing machine</b>	3
7.	<b>Exp.6:- Timers (Hardware + Software), Frequency Measurement.</b>	3
8.	<b>Exp.7:- Serial Communication</b>	3
9.	<b>Exp.8:- A/D Converter</b>	3
10.	<b>Exp.9:- Pulse Width Modulation (PWM)</b>	3
11.	<b>Exp.10:- Interfacing with PIC</b>	3

**Ground Rules:**

- **Attendance:**

Students are expected to attend EVERY CLASS SESSION and they are responsible for all material, announcements, schedule changes, etc., discussed in class. The university policy regarding the attendance will be strictly adhered to.

- **Make up Examinations**

There will be no make up exams for any exam that will be taken during the course. exceptions to this rule is restricted only to the following cases:-

1. Death of only first order relatives (father, mother, sister, or brother).
2. Hospital entry (in-patient) during thr time of the examination.

Any other cases will be given the zero mark in the corresponding exam.

**Assessments:**

Exams, Quizzes, Projects, and Assignments.

**Grading policy:**

<b>Assessments</b>	<b>Mark</b>
<b>Short Exam</b>	10
<b>Midterm exam</b>	30
<b>Project</b>	20
<b>Final Exam</b>	40
<b>Total</b>	<b>100</b>

**Last Updated:**

September. 2019