The University of Jordan
College of Engineering & Technology
Department of Computer Engineering
Fall Term 2016

Course:	Embedded Systems Lab – 0907334 (1 Cr. – Core Course)
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.
Co-requisites by Course:	Embedded Systems (0907333)
Prerequisites by Topic:	Good background in electronics, circuits, digital logic, and assembly programming.
Textbook:	The Lab has a set of experiments that will be posted on the website of the lab
References:	• Designing Embedded Systems with PIC Microcontrollers (principles and applications), 2nd Ed. By: Tim Wilmshurst, Newnes, 2007. • An Introduction to the Design of Small-Scale Embedded Systems, 1st Ed. By: Tim Wilmshurst Palgrave, 2001. • Microchip Website: www.microchip.com
Course Website:	http://embedded-ju.ucoz.com/
Schedule & Duration:	15 Weeks, 12 labs, 3 hr. each (including exams)
Student Material:	Text book, class handouts, some instructor keynotes, calculator and access to a personal computer and internet.
College Facilities:	Lab with whiteboard, personal computers, kits, programmers, oscilliscopes and server.
Course Objectives:	The objectives of this course are: 1. Introduce students to embedded systems design tools and hardware programmers 2. Give the students skills in 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
Course Outcomes and Relation to ABET Program Outcomes:	1. Experience with a set of tools for embedded systems programming and debugging. [b, k] 2. Experience with implementing several embedded systems with particular focus on the interaction between multiple devices.[b] 3. Design products using microcontrollers and various analog and digital ICs. [b,c,d] 4. Can read the datasheet for any embedded system, understand how it works. [b] 5. Develop existing embedded systems by formulating the system design problem including the design constraints, create a design that satisfies the constraints, implement the design in hardware and software, and measure performance against the design constraints. [b,c,d]

Lab Schedule

Date (Week Start)	Event
4/9/2016	Lab Preparations
18/9/2016	Introduction to MPLAB
25/9/2016	MPLAB and Instruction Set Analysis 1
2/10/2016	**No Lab**
9/10/2016	Instruction Set Analysis 2 & Modular Programming Techniques
16/10/2016	Basic Embedded System Analysis and Design + Introducing Protus
23/10/2016	Hardware excercises + **Quiz + Project Announcement**
30/10/2016	LCD
6/11/2016	Timers
13/11/2016	**Midterm Exam**
20/11/2016	USART
27/11/2016	A/D
4/12/2016	Using HI-TECH C compiler in MPLAB
18/12/2016	Project Submission & Discussion
Last Week of Study	**Final Exam**

Attendance:

Class attendance will be taken and the university's polices will be enforced in this regard.

Assessments:

Quizzes, exams, project and in-lab assessment

Grading policy:

Pre-labs & Labsheets	15%
Quiz	10%
Midterm Exam	20%
Project	15%
Final Exam	40%

Instructors:

Dr.Waleed Dweik, w.dweik@ju.edu.jo
Eng. Saadeh Sweadan, s.sweadan@ju.edu.jo
Eng.Ola Al-Jaloudy, o.jaloudy@ju.edu.jo
Eng. Abeer Awad, a.awad@ju.edu.jo

Class Time and Location:

Section 1: Sunday; 1:00 pm— 4:00 pm, Embedded Systems Lab
Section 2: Monday; 12:30 pm— 3:30 pm, Embedded Systems Lab
Section 3: Tuesday; 1:00 pm— 4:00 pm, Embedded Systems Lab
Section 4: Wednesday; 12:30 pm— 3:30 pm, Embedded Systems Lab
Section 5: Thursday; 1:00 pm— 4:00 pm, Embedded Systems Lab

Program Outcomes (PO)

a	An ability to apply knowledge of mathematics, science, and engineering
b	An ability to design and conduct experiment as well as to analyze and interpret data.
c	An ability to design a system, component, or process to meet desired needs , within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
d	An ability to function on multidisciplinary teams
e	An ability to identify, formulate, and solve engineering problems
f	An understanding of professional and ethical responsibility.
g	An ability to communicate effectively
h	The broad education necessary to understand the impact of engineering solutions in a gloabal, economic, environmental, and societal context
i	A recognition of the need for, and an ability to engage in life-long learning
j	Knowledge of contemporary issues
k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Last Updated:

September 17, 2016