The University of Jordan
School of Engineering
Department of Computer Engineering
Fall Term - A.Y. 2025 - 2026

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, I/O techniques and requirements, A/D conversion, serial communication. • Experiments to explore the system design process using hardware-software co-design process. • Design project.
Pre-requisites by Course:	Embedded Systems (**0907333**)
Prerequisites by Topic:	Good background in electronics, circuits, digital logic, and assembly programming.
Textbook:	The lab manual which consists of a set of experiments is posted on MS teams.
References:	• Designing Embedded Systems with PIC Microcontrollers (principles and applications), 2nd Ed. • Microchip Website: www.microchip.com
Course Website:	MS Teams
Schedule & Duration:	14 Weeks, 10 labs, 3 hr. each (including exams)
Student Material:	Textbook, lab handouts, some instructor keynotes, calculator and access to a personal computer and internet.
College Facilities:	Lab with whiteboard, personal computers, PIC development boards, PIC programmers, oscilloscopes and server.
Course Objectives:	The objectives of this lab are: • Introduce students to embedded systems design tools and hardware programmers. • Develop students' skills in both simulation and practical implementation of the basic building blocks of a microcontroller including timers, counters, I/O techniques and requirements, A/D conversion, serial communication. • Improve students' communication skills and ability to formulate and solve engineering problems through the complete designing of a medium embedded system with detailed documentation and oral presentation.

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<tr><td>Course Outcomes and Relation to ABET Program Outcomes:</td><td colspan="2">Upon successful completion of this course, a student should be able to:
Use a set of tools for embedded systems simulation, programming, debugging, system integration, testing, validation and verification. [6]
Implement several embedded systems with particular focus on the
interaction between multiple devices. [1, 6]
Take part of a multidisciplinary team to design products using microcontrollers and various analog and digital ICs. [5]
Read the datasheet of any embedded system and understand how it works [7]
Develop existing embedded systems by formulating the system design problem including the design constraints, creating a design that satisfies the constraints, implementing the design in hardware and software, and measuring performance against the design constraints. [2]
Communicate effectively with lab instructor and lab mates through clear documentation and presentation of the designed project. [3]</td></tr>
<tr><td>Lab Schedule:</td><td>Week of</td><td>Event</td></tr>
<tr><td></td><td>12/10</td><td>Introduction + Introduction to MPLAB</td></tr>
<tr><td></td><td>19/10</td><td>Instruction Set Analysis 1</td></tr>
<tr><td></td><td>26/10</td><td>Instruction Set Analysis 2 & Modular Programming Techniques</td></tr>
<tr><td></td><td>2/11</td><td>Basic Embedded System Analysis and Design</td></tr>
<tr><td></td><td>9/11</td><td>LCD + Quiz</td></tr>
<tr><td></td><td>16/11</td><td>Embedded C</td></tr>
<tr><td></td><td>23/11</td><td>Midterm Exam</td></tr>
<tr><td></td><td>30/11</td><td>No lab</td></tr>
<tr><td></td><td>7/12</td><td>Timers</td></tr>
<tr><td></td><td>14/12</td><td>A/D + Project Announcement</td></tr>
<tr><td></td><td>21/12</td><td>USART</td></tr>
<tr><td></td><td>28/12</td><td>Hardware exercises</td></tr>
<tr><td></td><td>4/1</td><td>Project Submission & Discussion</td></tr>
<tr><td></td><td>11/1</td><td>Final Exam</td></tr>
<tr><td>Attendance:</td><td colspan="2">Lab attendance will be taken and the university polices will be enforced in this regard.</td></tr>
<tr><td>Assessments:</td><td colspan="2">Quizzes, exams, project and in-lab assessment</td></tr>
<tr><td>Grading policy:</td><td colspan="2">Lab sheets 10%
Quiz 10%
Midterm Exam 20%
Project + Report 15% + 5%
Final Exam 40%</td></tr>
<tr><td>Instructors:</td><td colspan="2">Eng. Rawan Aljamal (r.aljamal@ju.edu.jo)</td></tr>
<tr><td>Sections:</td><td colspan="2">(1) Sunday 1:30 – 4:30
(2) Wednesday 1:00 – 4:00</td></tr>
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Program Outcomes (PO)

1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3	An ability to communicate effectively with a range of audiences
4	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Last Updated: February 24th, 2025