



# Philadelphia University

Faculty of Engineering - Department of Computer Engineering  
First Semester 2022/2023

## Course Details:

- Title:** Embedded Systems (610424)
- Prerequisite:** Microprocessors (610323)
- Credit Hours:** 3 credit hours (16 weeks per semester, approximately 44 contact hours)
- Textbook:** “Designing Embedded Systems with PIC Microcontrollers: Principles and Applications”, Second Edition, By: Tim Wilmshurst
- References:** “Embedded Systems: Architecture, Programming & Design”, by: R. Kamal, 1st edition, McGraw Hill, USA 2007.  
“PIC Microcontroller and Embedded systems using assembly and C” by M. Mazidi, R. Mckinlay, D. Causey, Pearson Education 2008
- Course Description:** The course is an introduction to microcontroller-based embedded systems design, development and implementation. It includes embedded system types, microcontroller architecture, programming, I/O interfacing, interrupt management and other related topics.
- Website:** <https://www.philadelphia.edu.jo/academics/anazer/>
- Instructor:** Eng. Anis Nazer  
**Email:** anis.nazer@gmail.com

## Course Outline:

Week	Topic
1	Course Introduction Review of Computer Basics
2, 3	PIC microcontroller: - Architecture and Operation - Instruction Set - I/O Ports
4, 5, 6	PIC Programming, examples and simulation
7, 8, 9	Interfacing PIC with external Devices (LEDs, Motors, LCDs...)
10, 11, 12	A/D conversion
13	I/O hardware
14, 15	Interrupts and timers
16	Review, and final exam

## Course Learning Outcomes with reference to ABET Outcomes:

Upon successful completion of this course, the student should:

1.	Identify an embedded system, and the components of the system	[1,7]
2.	Be able to design and implement an embedded system	[1,2,6]
3.	Understand the basic components of an embedded system	[1,7]
4.	Understand the operation of PIC microcontroller	[1]
5.	Interface various input/output devices to the PIC microcontroller	[2,7]
6.	Have the ability to troubleshoot and fix a problem in an embedded system	[2,7]

## Assessment Guidelines:

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

**Sub-Exams:** The students will take a scheduled midterm written exam during the semester. The midterm will cover material given in lectures in the previous 6-7 weeks.

**Quizzes:** Quizzes of (10-15) minutes will be conducted during the semester.

**Course project:** The project is an implementation of a simple embedded system. It is divided into three graded phases, Design, Simulation, and Implementation. Each student should work individually on the project and it should be submitted before or on a set agreed date.

**Cheating by copying homework or project from others is strictly forbidden and punishable by awarding the work with zero mark.**

**Course Participation:** Discussions will be carried out during lectures. Individual students will be assessed accordingly.

**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:

Midterm	30%
Course work activities - Quizzes - Assignments -Discussions	30%
Final Exam	40%
Total:	100%

## Attendance Regulation:

The semester has in total 45 credit hours. Total absence hours from classes and tutorials must not exceed 15% of the total credit hours. Exceeding this limit without a medical or emergency excuse approved by the deanship will prohibit the student from sitting the final exam and a zero mark will be recorded for the course. If the excuse is approved by the deanship the student will be considered withdrawn from the course.