



Course:	Embedded Systems – 0907333 (3 Cr. – Core Course)
Catalog Data:	The main objectives of this course are: learning and understanding basics of embedded systems, microcontrollers' architectures, programming microcontrollers, designing simple embedded systems, and linking various concepts of electronics and circuits within the embedded systems framework.
Prerequisites by Course:	0907231 Digital Logic & 0903261 Electronics (1)
Prerequisites by Topic:	Students are assumed to have had sufficient knowledge pertaining to digital system design and electronic devices.
Textbook:	Designing Embedded Systems with PIC Microcontrollers: Principles and Applications, Tim Wilmshurst, 2 nd edition, Newnes, 2009.
References:	<ul style="list-style-type: none">• An Introduction to the Design of Small-Scale Embedded Systems, Tim Wilmshurst, Palgrave, 2001.• Microchip® Website, www.microchip.com .
Course Website:	MS Teams
Minimum Student Material:	Textbook, class handouts, some instructor keynotes, calculator and access to a personal computer and internet.
Minimum College Facilities:	Classroom with whiteboard and projection display facilities, library, and computational facilities.
Course Objectives:	The objectives of this course are: <ol style="list-style-type: none">1. Introduce students to embedded systems and microcontrollers2. Software and hardware design of small to medium scale embedded systems.
Course Outcomes and Relation to ABET Program Outcomes:	Upon successful completion of this course, a student should be able to: <ol style="list-style-type: none">1. Understand the concept of embedded systems and microcontrollers.2. Write software programs for small to medium scale embedded systems. [1]3. Interface simple devices such as LEDs, switches, keypads, motors and sensors to microcontrollers to design embedded systems. [1]4. Configure and use built-in analog digital convertors found in microcontrollers. [1]5. Configure and use built-in serial communication modules in microcontrollers. [1]
Course Topics:	<ol style="list-style-type: none">1. Getting Started with Embedded Systems (Chapter 1)2. Introducing the PIC Mid-Range Family and the PIC16F84A Number Systems and Operations (Chapter 2)

3. Parallel Port, Power Supply and the Clock Oscillator (Chapter 3)
4. Starting to Program (Chapter 4)
5. Building Assembler Programs (Chapter 5)
6. Working with Time: Interrupts, Counters and Timers (Chapter 6)
7. The Human and Physical Interfaces (Chapter 8)
8. Taking Timing Further (Chapters 9)
9. Starting with Serial (Chapter 10)
10. Data Acquisition and Manipulation (Chapter 11)

Computer Usage: Practical aspects of the course are covered in the Embedded Systems Lab 0907334.

Attendance: Class attendance will be taken every class and the university's policies will be enforced in this regard.

Assessments: project and Exams.

Grading policy:

Report	5%	TBA
Midterm Exam	30%	TBA
Quizzes	5%	TBA
Project	10%	TBA
Final Exam	50%	TBA

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Office hours 10:00 –11:00 S,T, Th

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: FEB 1ST, 2023