DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
COURSE SYLLABUS

EE 366: Microprocessors and Microcontrollers

COURSE TITLE	*CODE & NUMBER*	*SUBJECT AREA*	Contact Hours			Credit Units
			Th.	*Pr.*	*Tr.*	
Microprocessors and Microcontrollers	**EE 366**	Engineering and Design	2	3		3
Pre-requisites:	EE 202, EE 360					
Course Role in Curriculum *(Required/Elective):*	Required Course					
Catalogue Description: Design of microcontroller-based embedded systems. Overview of a single-chip microcontroller, hardware and software concepts in microcontrollers. System architecture, central processing unit (CPU), internal memory (ROM, EEPROM, RAM, FLASH). Input/ Output ports, serial communication, programmable interrupts. ADC, DAC, interfacing and timers. Microcontroller programming model and instruction set, assembly and C language programming.						

***Textbooks*:**
(Author, Title, Pub., year)

Muhammad Ali Mazidi, Rolin D. McKinlay, and Danny Causey, *PIC Microcontroller And Embedded Systems – Using Assembly And C For PIC18*, MicroDigitalEd, 2016.

***Supplemental Materials*:**

1. Barry B. Brey, *Applying PIC18 Microcontrollers Architecture, Programming and interfacing Using C and Assembly*, Prentice Hall, 2008.
2. Dogan Ibrahim, *Advanced PIC Microcontroller Projects in C: from USB to RTOS with the PIC18F Series*, Elsevier, 2008.

***Course Learning Outcomes*:**

By the completion of the course the students should be able to:

1. Identify the Hardware Architecture, Memory, Register Structure of a PIC Micro-controller and the differences and similarities between a Microprocessor and Microcontroller.
2. Explain and Apply PIC I/O Port Programming
3. Develop an ability to interface a microcontroller to various devices.
4. Develop an ability to effectively utilize the wide variety of peripherals integrated into a microcontroller.
5. Illustrate an ability to interface Push buttons, Keypads, LED's, LCD, DAC's, real time clocks and other sensors to a PIC Microcontroller.
6. Develop an ability to write a code that will perform a task based on a word description of a problem.
7. Write an effective program for any PIC Microcontroller using Assembly Languages
8. Write an effective program for any PIC Microcontroller using C Languages
9. Develop an experience to debug a microcontroller-based system and to analyze its

performance using debug tools.

10. Demonstrate how to develop, run, and experimentally validate code written in an assembly and C languages for a microcontroller system.
11. Develop skills to prepare effective written technical communications for engineering analysis and design work through lab and project reports.

Topics to be Covered:		***Duration in Weeks***
1.	Introduction to Computing, Embedded Systems, The PIC Microcontrollers: History and Features	1
2.	PIC Architecture & Assembly Language Programming	2
3.	Branch, Call, and Time Delay Loop	1
4.	PIC I/O Port Programming	1
5.	Arithmetic, Logic Instructions, and Programs	1
6.	PIC Programming in C	1
7.	PIC Timer Programming in Assembly and C	1
8.	PIC Serial Port Programming in Assembly and C	1
9.	SPI and I2C buses	1
10.	Interrupt Programming in Assembly and C	1
11.	LCD and Keyboard Interfacing	1
12.	ADC, DAC, and Sensor Interfacing	1
13.	Motor Control	1

Key Student Outcomes addressed by the course: (Put a ✓ sign)

(1)	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	
(2)	An ability to apply the 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, creates 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	✓

Instructor or course coordinator: Dr. Wassim Zouch
Last updated: Spring 2020