MARMARA UNIVERSITY - FACULTY OF ENGINEERING

2017-2018 Spring

CSE4087 Embedded System Design

COURSE DESCRIPTION FORM

Offering Department	Department of Computer Engineering		Technical Elective
Course Code	CSE4087		
Course Name	Embedded System Design		
Language of Instruction	English		
ECTS	5		
Contact Hours	Theoretical (T): 3	Practice (P): 0	Laboratory (L):0
Pre-requisites			
Instructor	**Name**	Betül Boz	
	E-mail	betul.demiroz@marmara.edu.tr	
Course Materials	**Mandatory**	Kitap: Yifeng Zhu, Embedded Systems with ARM Cortex-M3 Microcontrollers in Assembly Language and C, Third Edition, E-Man Press LLC, July 2017. Other materials and announcements are shared on the course web page.	
	Recommended	Jonathan W Valvano, Embedded Systems: Introduction to Arm® Cortex™-M Microcontrollers, Fifth Edition, June 2014.	
Course Objectives	This course is intended to teach students the basic concepts of embedded systems design and programming.		
Course Content	Basics of embedded systems design and programming, interrupts, GPIO, timers, direct memory Access, data conversion and serial communication.		
Learning Outcomes	**LO1**	Learn the basic components, structure and operation of an embedded system.	
	LO2	Design software for microcontroller-based systems containing various input/output devices and memory components.	
	LO3	Understand the assembly language of a microcontroller, and write software for the embedded environment.	
	LO4	Learn hardware and software aspects about memory design, interrupts, and I/Os.	
	LO5	Design embedded systems using interrupts, timers, GPIO and serial communication.	

Program Outcomes		**LO1**	**LO2**	**LO3**	**LO4**	**LO5**
PO3	Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way so as to meet the desired result (a); ability to apply modern design methods for this purpose (b).					a
PO4	Ability to devise (a), select, and use (b) modern techniques and tools needed for engineering practice (1); ability to employ information technologies effectively (2).		1a	1a		
PO13	Knowledge of mathematics, basic sciences (a), computer science (b) and engineering sciences (c) required for the design and analysis of complex electrical and electronic devices, software and systems including hardware and software.	b		b	b	

	No	**Week**	**Subjects**	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**
Subjects (Knowledge, Skills and Behaviours), **Contributions of Subjects to Learning Outcomes,** **Assessment Methods**	**S1**	1	Introduction to Embedded Systems	MF				
	S2	2	Embedded System Design Process	MF				MF
	S3	3	ARM Processor	MF		MF,Q		
	S4	4	Memory Organization and Addressing		MF			
	S5	5	Instruction/Data Representation and Manipulation			MF		
	S6	6-7	ARM Instruction Set Architecture			MF,Q		
	S7	8	Branch and Conditional Execution			MF		
	S8	9	Structured Programming			MF,Q		
	S9	10	Subroutines					P
	S10	11	Linker and Loader					MF,P
	S11	12	Exceptions				MF	
	S12	13	Interrupt Service Routines				MF, P	
	S13	14	General Purpose Input/Output		P			

	No	**Type**	**Weight**	**Implementation Rule**	**Make-up Rule**
Assessment Methods and Weights	**MF**	Midterm, Final	60%	There will be one midterm and one final exam. Exams are closed boks and notes. Calculation and communication tools are not allowed during the exams.	Marmara University regulations will be followed for make-up exams.

	Q	Quiz	10%	2 or 3 quizzes are applied.	
	P	Project	30%	Programming projects are given. Students are asked to perform a demo for evaluation.	
	TOTAL		100%		

Determining Letter Grades

- The letter grades will be determined based on the midterm and final exams, quizzes and homeworks.
- In order to determine the letter grade, a curve or catalog based method will be followed based on the total average scores of the students.
- The final exam score and the total average score of the student must be at least 35 to pass the course.
- According to Marmara University Undergraduate regulations, the weight of the final exam must be at least 40 out of 100.

Assessment	Midterm	Quizzes	Project	Final	TOTAL
Weight	20	10	30	40	100

Teaching Method, Student Work Load

Time Applied by the Instructor

No	Method	Explanation	Hours
1	Lectures	Lectures are given in class using the board or via presentations. Example questions are solved to enhance the concepts.	14x3=42
2	Problem Session/ Practice	Problems related to the course topics are solved on the board.	
3	Laboratory	Experiments are done in the laboratory or theoretical concepts covered during the lectures are practiced using computer exercises.	
4	Interactive Courses	Questions are asked to students during lectures and they are encouraged to guess the answers (peer learning is also in this category)	
5	Field Work	Students attend activities outside the campus.	
6	Midterm	Midterm exam is given during the midterm week.	2
7	Final	Final exam is given during the final exam week.	2

Estimated Time to be Allocated by a Student

8	Project	The students carry out research about the problem given in the project, design and implement their solution and prepare a report.	30
9	Homeworks	The students solve the problems given as homework.	6
10	Pre-class learning of Course Material	The students study and learn the new subjects from course materials.	14
11	Review of Course Material	Students review the course subjects from course materials to prepare for the exams and homeworks.	28
12	Office Hour	Students ask questions to the instructor or the assistant during office hours.	2
Total			126

Academic Honesty

Violations of scholastic honesty include, but are not limited to cheating, plagiarizing, fabricating information or citations, facilitating acts of dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students.

In case academic dishonesty is observed, the first authority is the instructor of the course. The instructor may decide to give the student zero for the homework(s)/lab(s)/exam(s), give the letter grade FF, or may take disciplinary action.