EMBEDDED SYSTEMS

1	Course Title:	EMBEDDED SYSTEMS
2	Course Code:	EEM4308
3	Type of Course:	Optional
4	Level of Course:	First Cycle
5	Year of Study:	4
6	Semester:	8
7	ECTS Credits Allocated:	4.00
8	Theoretical (hour/week):	3.00
9	Practice (hour/week):	0.00
10	Laboratory (hour/week):	0
11	Prerequisites:	-
12	Language:	Turkish
13	Mode of Delivery:	Face to face
14	Course Coordinator:	Arş. Gör. METİN HATUN
15	Course Lecturers:	-
16	Contact information of the Course Coordinator:	e-posta: kfidan@uludag.edu.tr Uludağ Üniversitesi, Bilgisayar Mühendisliği Bölümü Görükle Kampüsü, 16059 Nilüfer, Bursa
17	Website:	
18	Objective of the Course:	To have students comprehend the proper and integrated usage of hardware and software components necessary for embedded systems design through the implemented applications on a discovery kit that has STM32L0 series ARM-based microcontroller unit.
19	Contribution of the Course to Professional Development:	Engineering Sciences: %80; Engineering Design: %20
20	Learning Outcomes:	

	1	Being informed about the application areas and usage of the embedded systems
	2	Having understood the cooperational logic of hardware and software components that are available in an embedded system
	3	Being able to use appropriate programming and debugging techniques and tools for embedded systems software development
	4	Being able to develop proper driver units to manage some hardware elements
	5	Being able to design systems that run sequentially, concurrently, and in real-time
	6	Having implemented application projects of the systems that he or she designed
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21	Course Content:	

Course Content:

Week	Theoretical	Practice

1	Introduction: analog and digital systems; sequential, concurrent and real-time systems	
2	General-purpose processors: software, input/ouput units, addressing modes	
3	Interrupt service routines (ISR)	
4	Standard single-purpose processors: peripherals	
5	Timer module and counters, Pulse width modulation (PWM)	
6	Analog to digital converters (ADC)	
7	Digital to analog converters (DAC)	
8	Universal synchronous asynchronous recieve and transmit (USART)	
9	Inter-integrated circuit (I2C) interface	
10	Serial peripheral interface (SPI)	
11	Sequential, concurrent, and controls systems design with computation models	
12	Custom single-purpose processors: hardware	
13	Memories and interfacing, modern design tools	
14	Application project presentations	
22	Textbooks, References and/or Other Materials:	1. Embedded System Design: A Unified Donanım/Yazılım Introduction, F. Vahid and T. Givargis, John Wiley & Sons,

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	3.00	42.00
Practicals/Labs	0	0.00	0.00
Self study and preperation	0	0.00	0.00
Homeworks	4	8.00	32.00
Projects	1	32.00	32.00
Field Studies	0	0.00	0.00
Midterm exams	0	0.00	0.00
Others	0	0.00	0.00
Final Exams		12.00	12.00
Total Work Load			120.00
Total Workload/ 30 hr			4.00
ECTS Credit of the Course			4.00

(Overlapping text: ARM Processor, L. D. Pyeatt, Newnes, 2016, ISBN: 978-0128036983 ; 5. RM0367 Reference Manual of Ultra-low-power STM32L0x3 Advanced Arm-based 32-bit MCUs. ; with STM32L053C8 MCU)

(Overlapping text from right column table: TERM LEARNING ACTIVITIES | NUMBER | WEIGHT ; Quiz 0 | 0.00 ; Final Exam 1 | 40.00)

Contribution of Term (Year) Learning Activities to Success Grade	60.00
Contribution of Final Exam to Success Grade	40.00
Total	100.00
Measurement and Evaluation Techniques Used in the Course	Homeworks, Projects, Exams

24	ECTS / WORK LOAD TABLE

25	CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS															
	PQ1	PQ2	PQ3	PQ4	PQ5	PQ6	PQ7	PQ8	PQ9	PQ10	PQ11	PQ12	PQ13	PQ14	PQ15	PQ16
ÖK1	3	1	1	2	1	1	2	1	2	1	1	2	0	0	0	0
ÖK2	4	2	4	5	1	2	2	2	3	1	1	1	0	0	0	0
ÖK3	4	3	2	5	1	5	2	2	3	2	2	1	0	0	0	0
ÖK4	5	3	5	5	3	5	2	2	3	3	2	1	0	0	0	0
ÖK5	5	4	5	3	2	5	2	1	1	2	1	1	0	0	0	0
ÖK6	5	4	2	5	3	5	2	2	3	3	2	1	0	0	0	0
LO: Learning Objectives PQ: Program Qualifications																
Contribution Level:	1 very low			2 low			3 Medium			4 High				5 Very High		