EMBEDDED SYSTEMS

1	Course Title:	EMBEDDED SYSTEMS
2	Course Code:	BMB4014
3	Type of Course:	Optional
4	Level of Course:	First Cycle
5	Year of Study:	4
6	Semester:	8
7	ECTS Credits Allocated:	5.00
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:	Prof. Dr. KEMAL FİDANBOYLU
15	Course Lecturers:	
16	Contact information of the Course Coordinator:	ceydanur@uludag.edu.tr
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:	
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, ... 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

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	13	2.00	26.00
Homeworks	4	10.00	40.00
Projects	1	30.00	30.00
Field Studies	0	0.00	0.00
Midterm exams	0	0.00	0.00
Others	0	0.00	0.00
Quiz	1	10.00	10.00
Total Work Load			148.00
Total Workload/ 30 hr			4.93
ECTS Credit of the Course			5.00

TERM LEARNING ACTIVITIES	NUMBER	WEIGHT
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	

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	0	1	2	0	2	1	1	2	0	0	0	0
ÖK2	4	2	4	5	1	2	2	2	3	0	0	0	0	0	0	0
ÖK3	4	3	2	5	1	5	2	2	3	2	2	0	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	0	0	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		