MECHATRONICS

1	Course Title:	MECHATRONICS	
2	Course Code:	MAK5248	
3	Type of Course:	Optional	
4	Level of Course:	Second Cycle	
5	Year of Study:	1	
6	Semester:	2	
7	ECTS Credits Allocated:	6.00	
8	Theoretical (hour/week):	3.00	
9	Practice (hour/week):	0.00	
10	Laboratory (hour/week):	0	
11	Prerequisites:	Without prerequisite	
12	Language:	Turkish	
13	Mode of Delivery:	Face to face	
14	Course Coordinator:	Prof. Dr. ELİF ERZAN ERZAN TOPÇU	
15	Course Lecturers:	Doç. Dr. Gürsel ŞEFKAT	
16	Contact information of the Course Coordinator:	Prof. Dr. Elif ERZAN TOPÇU erzan@uludag.edu.tr +90 224 294 1990 Bursa Uludağ Üniversitesi Mühendislik – Fakültesi Makine Mühendisliği Bölümü 16059 Görükle/BURSA	
17	Website:		
18	Objective of the Course:	Explanation of mechatronics, as an engineering discipline, is the synergistic combination of mechanical engineering, electronics, control engineering, and computers, all integrated through the design process. Investigation of key elements of mechatronics and deriving the necessary mathematical relations. Design and development of intelligent part of mechatronics; controllers. Also, realization of numerical solutions of mechatronics systems problems in MATLAB/Simulink environment.	
19	Contribution of the Course to Professional Development:	Understand the mechatronic systems. Gains knowledge of multidisciplinary field by performing the design and control of these systems	
20	Learning Outcomes:		
		1	Understand mechatronics, as an engineering discipline, is the synergistic combination of mechanical engineering, electronics, control engineering, and computers.
		2	Comprehend the role of control in the mechatronic systems.
		3	Understand the key elements of mechatronics and their role in the integrity of mechatronics.
		4	Understand design characteristics and criterions of the mechatronic systems.
		5	Understand types of actuators and roles of actuators used in the mechatronic system and derive the actuator models.
		6	Understand types of sensors and roles of sensors used in the mechatronic system.
		7	Understand the fundamentals of power electronics as it applies to mechatronic system actuators.

	8	Understand industrial motion control: types of controllers (PID-type control modes and variations), tuning of controllers, and position/velocity control loops with encoders.
	9	
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21	Course Content:

Course Content:

Week	Theoretical	Practice
1	Introduction Mechatronics. Basic descriptions.	
2	Mechatronics system design methods.	
3	Components of mechatronics system and their characteristics.	
4	Role of system dynamic and automatic control in Mechatronics.	
5	Review of controllers and controller design used in mechatronics systems.	
6	Control system applications	
7	Actuators, types of actuators and their characteristics.	
8	Modeling of actuators.	
9	Numerical solution of the actuator models: MATLAB/Simulink applications.	
10	Sensors, type of sensors and their characteristics.	
11	Laboratory study	
12	A brief review of digital electronic and microcontrollers	
13	Arduino applications	
14	Student presentations	

22	Textbooks, References and/or Other Materials:	1. Mechatronics :Electronic control systems in mechanical and electrical engineering, William Bolton, 2015, Pearson. 2. MEKATRONİK Temelleri - Fundamentals of MECHATRONICS. Musa Jouaneh (Editör: Tolga YÜKSEL), Nobel Yayıncılık. 2020. 3. MECHATRONICS- An Introduction – Edit by Robert H Bishop, CRC Pres-Toylar & Francis Group, 2006 4. Mechatronic System Fundemantals, Rolf Isermann, Springer-Verlag London Limited, 2005 5. Mechatronics-Electronic control systems in mechanical engineering, W. Bolton, Addison Wesley Longman Limited, 2nd Edition, 1999. 6. Mechatronic Servo System Control, M. Nakamura, S. Goto, N. Kyura, Springer-Verlag Berlin Heidelberg 2004. 7. Mechatronic Systems, Sensors, and Actuators, Edit by Robert H Bishop, CRC Pres-Toylar & Francis Group, 2008.
23	Assesment	

TERM LEARNING ACTIVITIES	**NUMBER**	**WEIGHT**
Midterm Exam	1	10.00
Quiz	0	0.00
Home work-project	3	30.00
Final Exam	1	60.00

Total	5	100.00
Contribution of Term (Year) Learning Activities to Success Grade		40.00
Contribution of Final Exam to Success Grade		60.00
Total		100.00
Measurement and Evaluation Techniques Used in the Course		Exam, homework

24 ECTS / WORK LOAD TABLE

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	14	6.00	84.00
Homeworks	3	15.00	45.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	1	5.00	5.00
Others	0	0.00	0.00
Final Exams	1	5.00	5.00
Total Work Load			181.00
Total work load/ 30 hr			6.03
ECTS Credit of the Course			6.00

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	3	2	3	0	0	0	0	0	0	0	0	0	0	0	0
ÖK2	1	1	4	1	0	0	0	0	0	0	0	0	0	0	0	0
ÖK3	0	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0
ÖK4	1	3	4	2	0	0	0	0	0	0	0	0	0	0	0	0
ÖK5	4	2	4	3	0	0	0	0	0	0	0	0	0	0	0	0
ÖK6	4	2	4	3	0	0	0	0	0	0	0	0	0	0	0	0
ÖK7	4	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0
ÖK8	4	3	4	3	0	0	0	0	0	0	0	0	0	0	0	0

LO: Learning Objectives PQ: Program Qualifications

Contribution Level:	1 very low	2 low	3 Medium	4 High	5 Very High