DISCRETE-TIME CONTROL SYSTEMS

1	Course Title:	DISCRETE-TIME CONTROL SYSTEMS	
2	Course Code:	EEM4113	
3	Type of Course:	Optional	
4	Level of Course:	First Cycle	
5	Year of Study:	4	
6	Semester:	7	
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:	Control Theory is advised	
12	Language:	Turkish	
13	Mode of Delivery:	Face to face	
14	Course Coordinator:	Doç. Dr. FİGEN ERTAŞ	
15	Course Lecturers:		
16	Contact information of the Course Coordinator:	E-posta:fertas@uludag.edu.tr Tel: (224) 294 2017 Adres: Elektrik-Elektronik Mühendisliği Bölümü, 5.Kat, No:524	
17	Website:	http://home.uludag.edu.tr/~fertas	
18	Objective of the Course:	To provide students with basic principles and design methods of discrete-time linear control systems.	
19	Contribution of the Course to Professional Development:	Students gain experience in advanced topics of automatic control systems.	
20	Learning Outcomes:		
		1	Gain sufficient knowledge on discrete-control systems; the ability to model and solve discrete-time control systems problems using theoretical and practical knowledge;
		2	Gain the ability to identify, model, and solve complex discrete-time control systems; the ability to select and apply appropriate analysis and modelling methods for these problems;
		3	Gain the ability to design partly or fully a complex system, process, device or a product in discrete-time control systems meeting specific requirements under realistic constraints and conditions;
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21	Course Content:		

Course Content:

Week	Theoretical	Practice
1	Introduction to Discrete-Time Systems and State Space Representation	

2	Canonical Forms	
3	Solution of Discrete-Time State Space Equations	
4	Discretization of Continuous Time State Space Equations	
5	Controllability and Observability	
6	Transforms for State Space Analysis	
7	Pole Placement with State Feedback	
8	Control System with reference input	
9	State Observers	
10	Full-Order and Current-Order Observers	
11	Min-Order Observers	
12	Observer Design via Pole Placement	
13	Deadbeat Response	
14	Servo Systems / Review	

22	Textbooks, References and/or Other Materials:	1. Discrete-time Control Systems, 2nd Ed., K. Ogata, Prentice Hall, 1995 2. Linear Systems : A State Variable Approach With Numerical Implementation, R. A. DeCArlo, Prentice Hall, 1989 3. State Variables for Engineers, 2nd Ed., P. M. DeRusso, R. J. Roy, C. M. Close and A. A. Desrochers, John Wiley and Sons, 1998

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	2.00	28.00
Homeworks	2	5.00	10.00
Projects	0	0.00	0.00
Quiz	0	0.00	
Field Studies	0	0.00	0.00
Midterm exams	1	20.00	20.00
Final Exam	1	60.00	
Others	0	0.00	0.00
Final Exams	1	20.00	20.00
Contribution of Term (Year) Learning Activities to		40.00	
Total Work Load			140.00
Total work load/ 30 hr			4.00
Contribution of Final Exam to Success Grade	60.00		
ECTS Credit of the Course			4.00

TERM LEARNING ACTIVITIES	NUMBER	WEIGHT
Midterm exams	1	40.00
Final Exam	1	60.00

Measurement and Evaluation Techniques Used in the Course	Measurement and evaluation are performed according to the Rules & Regulations of Bursa Uludağ University on Undergraduate Education.

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	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK2	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0

ÖK3	0	0	5	0	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**