ESOGU ELECTRICAL-ELECTRONICS ENGINEERING DEPARTMENT
COURSE INFORMATION FORM

Course Title	Course Code
DIGITAL CONTROL SYSTEMS	151228546

Semester in Program	Number of Course Hours per Week		ECTS Credit
	Theory	Practice	
8	3	2	7

Course ECTS Credit Distribution				
Basic Sciences	Engineering Sciences	Design	General Education	Social
	4	3		

Language of Instruction	Course Level	Course Type
English	Undergraduate	Required

Prerequisite	
Objectives of the Course	Analysis of discrete-time systems. Designing controllers for discrete-time systems
Brief Course Content	Introduction and definitions. Discrete-time systems and z transform. Sampling and reconstruction. Open-loop discrete-time systems. Closed-loop discretetime systems. Time response vharacteristics of discrete-time systems. Stability of discrete-time systems. Controller design. Pole placement and state observer design.

	Learning Outcomes of the Course	Contributed POs	Teaching Methods *	Assessment Methods **
1	Know how to sample analog signals and know how to reconstruct a signal from the samples.	1,2,3,5	1,3,4,10	A,B,D,I
2	Can analyze discrete-time systems	1,2,3,5	1,3,4,10	A,B,D,I
3	Can design a controller for discrete-time system and observe its effects on the system	1,2,3,5	1,3,4,10	A,B,D,I
4				
5				
6				
7				
8				

*Teaching Methods 1:Lecture, 2:Discussion, 3:Experiment, 4:Simulation, 5:Question-Answer, 6:Tutorial, 7:Observation, 8:Case Study, 9:Technical Visit, 10:Problem Solving, 11:Induvidual Work, 12:Team/Group Work, 13:Brain Storm, 14:Project Design / Management, 15:Report Preparation and/or Presentation
**Assessment Methods A:Exam, B:Quiz, C:Oral Exam, D:Homework, E:Report, F:Article Examination, G:Presentation, I:Experimental Skill, J:Project Observation, K:Class Attendance; L:Jury Exam

Main Textbook	Charles L. Phillips and H. Troy Nagle, "Digital Control System Analysis and Design," Prentice Hall, 1995, 3rd. Ed.
Supplementary Resources	Chen, Chi-Tsong, Analog and Digital Control System Design, Saunders College Publishing, 1993
Necessary Course Material	

Course Weekly Schedule	
1	Introduction, discrete-time signals, difference equations.

2	Z transform
3	Sampling. Reconstructing a signal from the samples.
4	Open-loop discrete-time systems.
5	Closed-loop discrete-time systems.
6	Relation between continuous and discrete-time systems. Poles and zeros
7	Time response characteristics of discrete-time systems.
8	Mid-Term Exams
9	Stability analysis of discrete-time systems
10	Controller design for discrete-time systems
11	State-space representation and analysis of discrete-time systems.
12	State-space representation and analysis of discrete-time systems.
13	Pole placement controller
14	state observer
15	Sample case designs
16,17	Final Exams

Calculation of Course Workload			
Activities	**Count**	**Time (Hour)**	**Total Workload (Hour)**
Weekly classroom time	14	3	42
Weekly study time (review, reinforcing, preparation)	14	2	28
Homework	5	4	20
Taking a quiz	4	1	4
Studying for a quiz	4	3	12
Lab Experiments	8	2	16
Studying for experiments	8	2	16
Report writing (Preparation and presentation time included)	8	2	16
Project (Preparation and presentation time included)			
Presentation (Preparation time included)			
Mid-Term Exam	1	2	2
Studying for Mid-Term Exam	1	20	20
Final Exam	1	2	2
Studying for Final Exam	1	20	20
		Total workload	198
		Total workload / 30	6.6
		Course ECTS Credit	7

Assessment	
Activity Type	**%**
Mid-term	25
Quiz	20
Homework	10
Experimental Skill	15

Final Exam	30
Total	100

<table>
<tr><td colspan="3" align="center">**COURSE CONTRIBUTION TO THE PROGRAM OUTCOMES**
(5: Very high, 4: High, 3: Middle, 2: Low, 1: Very low)</td></tr>
<tr><td align="center">**NO**</td><td align="center">**PROGRAM OUTCOMES**</td><td align="center">**Contribution**</td></tr>
<tr><td rowspan="4">**1**</td><td>a.   Sufficient knowledge of mathematics</td><td align="center">4</td></tr>
<tr><td>b.   Sufficient knowledge of basic sciences</td><td align="center">4</td></tr>
<tr><td>c.   Sufficient basic engineering and Electrical-Electronics engineering knowledge</td><td align="center">4</td></tr>
<tr><td>d.   Skill of applying all these knowledge and experience to complicated Electrical-Electronics engineering problems</td><td align="center">4</td></tr>
<tr><td>**2**</td><td>Skill of defining, identifying, formulating and solving the complicated problems in Electrical-Electronics engineering and related areas by applying appropriate analysis and modelling methods.</td><td align="center">4</td></tr>
<tr><td>**3**</td><td>Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions.</td><td align="center">4</td></tr>
<tr><td rowspan="2">**4**</td><td>To analyze and solve the complicated engineering problems:
a.   skill of developing, selecting and applying the required techniques and devices</td><td></td></tr>
<tr><td>b.   skill of using information technologies effectively</td><td></td></tr>
<tr><td rowspan="2">**5**</td><td>To study the complicated on the complicated Electrical-Electronics engineering problems and research subjects:
a.   skill of experimental design</td><td align="center">4</td></tr>
<tr><td>b.   skill of performing the experiments, collecting the data and analyzing and interpreting the results</td><td align="center">4</td></tr>
<tr><td rowspan="2">**6**</td><td>a.   Skill of performing individual studies</td><td></td></tr>
<tr><td>b.   Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies</td><td></td></tr>
<tr><td rowspan="4">**7**</td><td>a.   Skill of effective oral and written communication in Turkish and English</td><td></td></tr>
<tr><td>b.   Skill of improving and using foreign language knowledge</td><td></td></tr>
<tr><td>c.   Skill of effective reporting, understanding the reports and preparing the design and production reports</td><td></td></tr>
<tr><td>d.   Skill of effective presentation and giving and getting clear and understandable instructions.</td><td></td></tr>
<tr><td>**8**</td><td>Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology</td><td></td></tr>
<tr><td rowspan="2">**9**</td><td>a.   Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities</td><td></td></tr>
<tr><td>b.   Knowledge about legal regulations and standards of engineering</td><td></td></tr>
<tr><td rowspan="3">**10**</td><td>a.   Knowledge about project management, risk management and change management</td><td></td></tr>
<tr><td>b.   Awareness of the significance of entrepreneurship and innovation</td><td></td></tr>
<tr><td>c.   Knowledge about sustainable development</td><td></td></tr>
<tr><td>**11**</td><td>Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of Electrical-Electronics engineering; and awareness of the legal issues resulting from engineering solutions</td><td></td></tr>
<tr><td>**12**</td><td>Knowledge about modern problems in local and universal scale</td><td></td></tr>
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INSTRUCTORS				
Prepared by	Prof. Dr. Osman Parlaktuna			

Date: 06.07.2024