



**ESOGU ELECTRICAL-ELECTRONICS ENGINEERING DEPARTMENT
COURSE INFORMATION FORM**

Course Title	Course Code
LINEAR CONTROL SYSTEMS	151227637

Semester in Program	Number of Course Hours per Week		ECTS Credit
	Theory	Practice	
7	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	Designing appropriate controller and/or observer such that the feedback control system satisfies desired response.
Brief Course Content	Controller design using root locus and frequency response approaches. Lag, lead, lag-lead compensators, PI, PD ve PID controllers. State space analysis of control systems. Controllability and observability. Controller design by state space approach. State feedback controller. Observer.

Learning Outcomes of the Course	Contributed POs	Teaching Methods *	Assessment Methods **
1 Gaining knowledge on design concept	1,2,3,5	1,3,4,10	A,B,D,I
2 Having experience on design with different approaches	1,2,3,5	1,3,4,10	A,B,D,I
3 Learning how and in what capacity a system's requirements can be satisfied.	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:Individual 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	Ogata, K., Modern Control Engineering, Prentice Hall, Inc., 4th Ed. 2001
Supplementary Resources	Dorf, A., Modern Control Systems, Addison Wesley, 9th Ed., 2001. Nise, B., Control Systems Engineering, John Wiley, 3rd Ed., 2000
Necessary Course Material	

Course Weekly Schedule	
1	Introduction. Design criteria of control systems in time domain

2	Design criteria of control systems in frequency domain
3	Root locus design of lag and lead compensators.
4	Root locus design of lag-lead compensator,. PI, PD, and PID controllers.
5	Compensator and controller design using Bode diagrams.
6	Minor-loop controller design
7	Steady-state representation of dynamic systems
8	Mid-Term Exams
9	Canonic representations
10	Analysis of dynamic systems in state space
11	Controllability and observability
12	Controller and observer design
13	Observer-based controller design
14	Linear quadratic controller
15	Case studies
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
Bir öğe seçin.	

Final Exam	30
Total	100

COURSE CONTRIBUTION TO THE PROGRAM OUTCOMES

(5: Very high, 4: High, 3: Middle, 2: Low, 1: Very low)

NO	PROGRAM OUTCOMES	Contribution
1	a. Sufficient knowledge of mathematics	4
	b. Sufficient knowledge of basic sciences	4
	c. Sufficient basic engineering and Electrical-Electronics engineering knowledge	4
	d. Skill of applying all these knowledge and experience to complicated Electrical-Electronics engineering problems	4
2	Skill of defining, identifying, formulating and solving the complicated problems in Electrical-Electronics engineering and related areas by applying appropriate analysis and modelling methods.	4
3	Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions.	4
4	To analyze and solve the complicated engineering problems:	
	a. skill of developing, selecting and applying the required techniques and devices	
5	b. skill of using information technologies effectively	
	To study the complicated on the complicated Electrical-Electronics engineering problems and research subjects:	4
6	a. skill of experimental design	
	b. skill of performing the experiments, collecting the data and analyzing and interpreting the results	4
7	a. Skill of performing individual studies	
	b. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies	
	c. Skill of effective oral and written communication in Turkish and English	
	d. Skill of improving and using foreign language knowledge	
8	c. Skill of effective reporting, understanding the reports and preparing the design and production reports	
	d. Skill of effective presentation and giving and getting clear and understandable instructions.	
	Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology	
	a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities	
9	b. Knowledge about legal regulations and standards of engineering	
	a. Knowledge about project management, risk management and change management	
	b. Awareness of the significance of entrepreneurship and innovation	
10	c. Knowledge about sustainable development	
	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	
11	Knowledge about modern problems in local and universal scale	
12		

INSTRUCTORS

Prepared by	Prof. Dr. Osman Parlaktuna			
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Date:06.07.2024