



ESOGÜ Electrical-Electronics Engineering Department

COURSE CODE: 151228546-151248546 **COURSE TITLE:** Digital Control Systems

Semester	Weekly Hours		COURSE			
	Theoretical	Practical	Credits	ECTS	Type	Language
8	3	2	4	7	Compulsory () Elective (x)	Turkish () English (x)
Write the credit (for non-credit courses weekly hours) below (If necessary distribute the credits.).						
Math and Basic Science		Electrical Engineering [mark (√) if there is high design content]		General Education	Humanities	
0		4 (x)		0	0	
Assessment		THEORETICAL-PRACTICAL COURSES			LABORATORY COURSES	
		Type	Number	%	Activity Type	Number %
Midterm		Midterm	1	30	Quiz	
		Quiz			Lab performance	8 15
		Homework	5	10	Report	8 10
		Project			Oral exam	
		Other (.....)			Other (.....)	
Final				35		
Makeup exam (Oral/Written)		written				
Prerequisites						
Brief content of the course		Introduction and definitions. Discrete-time systems and z transform. Sampling and reconstruction. Open-loop discrete-time systems. Closed-loop discrete-time systems. Time response characteristics of discrete-time systems. Stability of discrete-time systems. Controller design. Pole placement and state observer design.				
Objectives of the course		Analysis of discrete-time systems. Designing controllers for discrete-time systems				
Contribution of the course towards professional education		Using a computer as a controller for a dynamic system is very useful for the Professional life of an electrical engineering student.				
Outcomes of the course		Students completing this course successfully 4. Know how to sample analog signals and also know how to reconstruct a signal from the samples. 5. Can analyze discrete-time systems 6. Can design a controller for discrete-time system and observe its effects on the system				
Textbook of the course		Charles L. Phillips and H. Troy Nagle, "Digital Control System Analysis and Design," Prentice Hall, 1995, 3rd. Ed.				
Other reference books		Chen, Chi-Tsong, Analog and Digital Control System Design, Saunders College Publishing, 1993				
Required material for the course		MATLAB program				

WEEKLY PLAN OF THE COURSE	
Week	Topics
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	Midterms
9	Midterms
10	Stability analysis of discrete-time systems.
11	Controller design for discrete-time systems.
12	State-space representation and analysis of discrete-time systems.
13	Pole placement controller and state observer
14	Sample case designs
15,16	Final exam

NO	OUTCOMES OF THE PROGRAMME	4	3	2	1
1	Adequate knowledge of mathematics, science and Electrical and Electronic Engineering; ability to practice theoretical and practical knowledge of these areas into modeling and solving complex problems of Electrical and Electronic Engineering		X		
2	Ability to identify complex engineering problems in Electrical and Electronic Engineering and related fields, for this purpose having skills to formulate, select and apply appropriate methods.		X		
3	Having skills to apply modern design methods to design a complex system, process, equipment or product that should work under realistic conditions and constraints and satisfy specific requirements concerning the Electrical and Electronic Engineering.		X		
4	Having skills to develop, select and apply modern techniques and tools needed to analyze and solve complex applications in Electrical and Electronic Engineering, skills to use information technology effectively.				
5	Skills to design and conduct tests, collect data, analyze results, and interpret data for the experimental investigation of complex problems in Electrical and Electronic Engineering				
6	Ability to function effectively as an individual and as a member of teams within the discipline and in multidiscipline areas.				
7	Communicating effectively in oral and written form both in Turkish and English. Effective report writing and understanding written reports, preparing design and manufacturing reports, making effective presentations, skills to give and receive clear and concise instructions.				
8	Awareness of the necessity of lifelong learning, access to information, monitoring developments in science and technology and the ability to self-renewing				
9	Understanding of professional and ethical responsibility				
10	Information on project management, change management and risk management practices, awareness on entrepreneurship and innovation, knowledge on sustainable development.				
11	Information about universal and societal effects of engineering applications on health, safety and environment; awareness of the legal consequences of engineering solutions.				

Scale for assessing the contribution of the course to the program outcomes:

4: High 3: Medium 2: Low 1:None

Name of Instructor(s): Prof. Dr. Osman Parlaktuna

Signature(s):

Date: 02.03.2016