AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Advanced Digital Control								
Course Code	EEE526		Couse Level	Second Cycle (Master's Degree)					
ECTS Credit	8	Workload	200 *(Hours)*	Theory	3	Practice	0	Laboratory	0
Objectives of the Course	This course aims to present the basic concepts, analysis, and design of advanced digital control systems								
Course Content	Introduction to digital control systems, Z-transform, stability of discrete-time systems, digital controller design, State space design, Polynomial approximation design, Quadratic optimal control systems								
Work Placement	N/A								
Planned Learning Activities and Teaching Methods	Explanation (Presentation), Demonstration, Discussion, Case Study, Project Based Study, Individual Study, Problem Solving								
Name of Lecturer(s)									

Assessment Methods and Criteria		
Method	Quantity	Percentage (%)
Midterm Examination	1	30
Final Examination	1	30
Assignment	4	20
Project	1	20

Recommended or Required Reading	
1	Digital Control Systems, Benjamin C. Kuo, Oxford University Press.
2	Discrete Time Control Systems , Katsuhiko Ogata, Prentice Hall.
3	Digital Control System Analysis and Design, Charles L. Phillips, H. Troy Nagle, Prentice Hall.
4	Digital Control of Dynamic Systems,3rd edition, Gene F. Franklin, J. David Powell, Michael L. Workman, Prentice Hall.
5	Digital Control Engineering Analysis and Design, M. Sam Fadali, Academic Press, 2009

Week	Weekly Detailed Course Contents	
1	Theoretical	Z-transform, Difference equations, Sampling and Holding, Pulse transfer function
2	Theoretical	Z-transform, Difference equations, Sampling and Holding, Pulse transfer function
3	Theoretical	Stability of discrete time systems, Jury test, Routh Hurwitz criterion, Nyquist criterion, Bode diagram
4	Theoretical	Stability of discrete time systems, Jury test, Routh Hurwitz criterion, Nyquist criterion, Bode diagram
5	Theoretical	Digital controller design, Lag-Lead design, PID design
6	Theoretical	Digital controller design, Lag-Lead design, PID design
7	Theoretical	State space design, State space representation of discrete time systems, Solution of state space equations, Matrix of pulse transfer function
8	Intermediate Exam	Midterm Exam
9	Theoretical	State space design, State space representation of discrete time systems, Solution of state space equations, Matrix of pulse transfer function
10	Theoretical	Controllability, Observability, Design with pole placement
11	Theoretical	Controllability, Observability, Design with pole placement
12	Theoretical	Design with polynomial approximation, Diophantine equation, Controller design with polynomial equation approach, Model predictive controller design
13	Theoretical	Design with polynomial approximation, Diophantine equation, Controller design with polynomial equation approach, Model predictive controller design
14	Theoretical	Quadratic optimal control systems, Quadratic optimal control, State space quadratic optimal control
15	Theoretical	Quadratic optimal control systems, Quadratic optimal control, State space quadratic optimal control
16	Final Exam	Final Exam

Workload Calculation				
Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	4	3	98
Assignment	4	10	3	52
Project	1	11	3	14
Midterm Examination	1	15	3	18
Final Examination	1	15	3	18
			Total Workload (Hours)	200
			[Total Workload (Hours) / 25*] = **ECTS**	8
25 hour workload is accepted as 1 ECTS				

Learning Outcomes	
1	To learn the basic concepts of digital control systems
2	Solving state-space equations of discrete-time systems
3	To learn stability analysis of digital control systems
4	To learn digital controller design
5	To learn quadratic optimal control systems

Programme Outcomes *(Electrical and Electronics Engineering Master)*	
1	Developing and intensifying knowledge that requires expertise in the area of Electrical-Electronics Engineering, and gaining the skills necessary to analyze and solve problems using this knowledge
2	Grasping the inter-disciplinary interaction related to Electrical-Electronics Engineering, interpreting and forming new types of knowledge by combining the knowledge from Electrical-Electronics Engineering and the knowledge from various other disciplines
3	Developing new approaches to solve the complex problems arising in Electrical-Electronics Engineering, coming up with solutions while taking responsibility and carrying out a specific study independently
4	Assessing the knowledge and skill gained in the area of Electrical-Electronics Engineering with a critical view
5	Transferring the current developments and one’s own work in Electrical-Electronics Engineering, to other groups in written, oral and visual forms
6	The ability to control the collecting, interpreting, practicing and announcing processes of the Electrical-Electronics Engineering related to data taking into consideration scientific, cultural and ethical values and the ability to teach these values to others
7	Developing application plans concerning the subjects related to Electrical-Electronics Engineering and the ability to evaluate the end results of these plans within the frame of quality processes

Contribution of Learning Outcomes to Programme Outcomes *1:Very Low, 2:Low, 3:Medium, 4:High, 5:Very High*

	L1	L2	L3	L4	L5
P1	4	4	4	4	4
P2	4	4	4	4	4
P3	4	4	4	4	4
P4	4	4	4	4	3
P5	4	4	4	4	4
P6	4	4	4	4	5
P7	4	4	4	4	4