AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Linear System Theory II								
Course Code	EEE502		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 provides an introduction to linear systems theory covering basic concepts such as system representation, stability, controllability, state feedback, state estimation, and realization.								
Course Content	Differential equations: existence and uniqueness, linear differential equations, stability of solutions, variational equation, periodically time-varying differential equations. Difference equations. Dynamical system representations: equivalence, linearity, time-invariance. Differential system representations: impulse response, system function, stability, algebraic equivalence, duality, controllability, observability, realizations. Transform techniques.								
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	40
Project	1	30

Recommended or Required Reading	
1	J.P. Hespanha. Linear Systems Theory . Princeton Press, 2009.

Week	Weekly Detailed Course Contents	
1	Theoretical	System Representation: State-space linear systems
2	Theoretical	System Representation: Linearization
3	Theoretical	System Representation: Transfer function
4	Theoretical	System Solution: Solutions to LTV systems
5	Theoretical	System Solution: Solutions to LTI systems
6	Theoretical	System Solution: Solutions to LTI systems (Jordan form)
7	Theoretical	Stability : Lyapunov stability
8	Intermediate Exam	Midterm Exam
9	Theoretical	Stability : Input-output stability
10	Theoretical	Controllability and State Feedback : Controllable and reachable subspaces
11	Theoretical	Controllability and State Feedback : Controllable systems
12	Theoretical	Controllability and State Feedback : Controllable decompositions
13	Theoretical	Controllability and State Feedback : Stabilizability
14	Theoretical	Observability and Output Feedback : Observability, Output feedback
15	Theoretical	Observability and Output Feedback : Minimal realizations
16	Final Exam	Final Exam

Workload Calculation				
Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	5	3	112
Project	1	49	3	52
Midterm Examination	1	10	3	13

Final Examination	1	20	3	23
			Total Workload (Hours)	200
			[Total Workload (Hours) / 25*] = **ECTS**	8
**25 hour workload is accepted as 1 ECTS*				

Learning Outcomes	
1	To learn system representation.
2	To learn system stability and controllability.
3	To learn state feedback of the systems.
4	To learn system’s state estimation, and realization.
5	To analysis system stability and controllability

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	5	4	4	4	5
P2	5	4	4	4	5
P3	4	4	5	5	4
P4	5	5	4	5	4
P5	4	3	5	4	5
P6	5	5	4	5	5
P7	4	4	4	4	5