

COURSE INFORMATION						
Course Title	Code	Year	Semester	T+P+L (Hour/Week)	Credits	ECTS
CONTROL SYSTEMS DESIGN	EEM514	5 th Year	Fall-Spring	3+0+0	3	7

Department	Electrical and Electronics Engineering
Course Level	Graduate
Language of Instruction	Turkish
Course Type	Elective
Mode of Delivery	Face-To-Face
Prerequisites and co-requisites	None
Recommended Optional Programme Components	Undergraduate level mathematics and control skills provide the required background for this course.
Name of Lecturer	Asst. Prof. Dr. Ata SEVİNÇ
Co-Lecturer	None
Work Placement	None
Teaching Methods	Explaining by writing on the board, then simulation applications with a computer and a projector.
Objectives of the Course	To teach the fundamental concepts and techniques in the systems control theory with simulation applications.
Learning Outcomes	Learning fundamental control concepts and techniques. Learning how to use simulation programs and to simulate. Learning basics of control applications with microcontrollers.
Course Content	State-space representation of systems and their illustrations with integrators or delays. Transfer function and other types of representations of linear time-invariant systems. Controllability and simple controller design. Observability and simple observer design. PID control and best gain assignment. State-space drawings. Quadratic scalar functions. Lyapunov's stability theorem. Introduction to optimal control. Simple optimal control applications. Control applications with PIC. PIC simulations.

COURSE CONTENT (SYLLABUS)		
Week	Topics	Study Materials
1	State-space representation of continuous-time systems and their illustrations with integrators.	Text book
2	Transfer function and other types of representations of linear time-invariant continuous-time systems.	Text book
3	State-space representation of discrete-time systems and their illustrations with delays.	Text book
4	Transfer function and other types of representations of linear time-invariant discrete-time systems.	Text book

5	Controllability and simple controller design for continuous-time systems.	Text book
6	Controllability and simple controller design for discrete-time systems.	Text book
7	Observability and simple observer design for continuous-time systems	Text book
8	Observability and simple observer design for discrete -time systems	Text book
9	PID control and best gain assignment.	Text book
10	State-space drawings.	Text book
11	Quadratic scalar functions. Lyapunov's stability theorem.	Text book
12	Introduction to optimal control.	Text book
13	Simple optimal control applications.	Text book
14	Control applications with PIC. PIC simulations.	Text book

RECOMMENDED SOURCES

Textbook	Otomatik Kontrol Sistemleri. Benjamin Kuo.
Additional Resources	Lecture notes

MATERIAL SHARING

Documents	http://AtaSevinc.net/kk/kk1.php
Assignments	Average of the assignment marks is entered as the midterm exam mark.
Exams	Final

ASSESSMENT

EXAMS	QUANTITY	PERCENTAGE
Contribution of Mid -Term Examination to Overall Grade	1	40
Contribution of Final Examination to Overall Grade	1	60
TOTAL	2	100

COURSE'S CONTRIBUTION TO PROGRAMME

Nr.	Programme Learning Outcomes	Contribution				
		1	2	3	4	5
1	Gaining the necessary theoretical and applied knowledge on engineering, mathematics, and science, gaining the ability for determining, defining, formulating electrical and electronics engineering problems.					X

2	Gaining the ability to choose and apply appropriate analysis, modeling and design methods in electrical-electronics engineering problems.					X
3	Gaining the ability to design a system, process, instrument, or product related to electrical-electronics engineering for a specific given purpose, gaining the ability to apply modern design tools.					X
4	Gaining the ability to evaluate the issues of security, robustness, adaptability, economy, ecological problems, sustainability in engineering solutions under realistic constraints and conditions.			X		
5	Gaining the ability of simulation, experimenting, design, interpreting results.					X
6	Gaining the ability to use contemporary techniques and tools, information technologies for engineering applications.					X
7	Gaining the ability to work alone or in a group efficiently in electrical-electronics engineering discipline or in interdisciplinary studies. Gaining the ability to act independently, to use initiative when needed, and to be creative.				X	
8	Gaining the ability to communicate efficiently by expressing his/her opinions in Turkish verbally or in written form in a concise manner. Gaining ability to communicate with international colleagues..				X	
9	Gaining the ability to be aware of career and ethical responsibility, legal consequences of engineering processes, project management, risk management, entrepreneurship, innovation, sustainable development, quality control.		X			
10.	Gaining the ability to reach new information by life-long learning; gaining the ability for self-improvement by following scientific and technological innovations.					X

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 16x Total course hours)	16	3	48
Hours for off-the-classroom study (Pre-study, practice)	16	2	32
Assignments	4	5	20
Presentation / Preparing Seminar			
Mid-term			
Final examination	1	2	2
Total Work Load			102
Total Work Load / 30 (h)			3.4
ECTS Credit of the Course			7