Alanya Alaaddin Keykubat University | Rafet Kayış Faculty of Engineering
Electrical-Electronics Engineering Department
2023-2024 Fall Semester

Syllabus

Code/Name	EEE 302 / Feedback Systems
Type	Required
Credit/ECTS	5/5
Hour per Week	3
Level/Year	Undergraduate/3
Semester	Spring
Classroom	A103
Content	Mathematical modeling: Transfer functions, state equations, block diagrams. System response; performance specifications. Stability of feedback systems: Routh-Hurwitz criterion, principle of argument, Nyquist stability criterion, gain margin and phase margin. Design of dynamic compensators. Analysis and design techniques using root-locus. State-space techniques: Controllability, observability, pole placement and estimator design.
Prerequisites	None
Textbooks	***Primary*** Modern Control Engineering : K. Ogata, Prentice Hall. 5th Edition 2010 ***Supplementary*** Automatic Control Systems : B. C. Kuo, Prentice Hall. 1995.
Objectives	• to comprehend systems and mathematical modeling concepts • to develop a solid understanding of stability and feedback notions • to expose students to feedback controller design for linear systems
Course Outcomes	In this course you will be able to: CO1 Understand the concept of control systems CO2 Know the basic control system properties and representations: transfer functions, block diagrams and state equations CO3 Make transient and steady-state response of second order linear control systems CO4 Understand the concept of system stability CO5 Make control system stability analysis using Routh-Hurwitz, root-locus methods and Nyquist stability criterion

Weekly Schedule of Topics

W	Topic
1	Open and closed loop control systems, advantages of feedback
2-3	Mathematical models, transfer functions and block diagrams
4	Transient and steady-state response analysis, detailed analysis on second order systems
5	Definition and types of state-space representations
6	Controllability and observability
7	Basic concepts, Routh-Hurwitz criterion
8	Definition of the Root Locus method and obtaining the locus
9	Plotting examples of root-locus
11	Short review of complex analysis for Nyquist criterion definition

12	Definition of relative stability and its application
13-14	Frequency domain analysis and compensator design

Contribution to Program Outcomes*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	5	5	5	5	0	3	2	3	1	0	0
CO2	5	5	5	5	0	3	2	3	1	0	0
CO3	5	5	3	5	0	3	2	3	1	0	0
CO4	5	5	3	5	0	3	2	3	1	0	0
CO5	5	5	5	5	0	3	2	3	4	0	0

* Contribution Level | 0: None | 1: Very Low | 2: Low | 3: Medium | 4: High | 5: Very High

Special Conditions	Students work in groups for the presentations.
Requirements	Basic knowledge of a dynamic analysis software and Matlab
Course Policy	• Be in the class on time. • English should always be used to communicate with one another. • At least 70% attendance is required, otherwise a grade of **DZ** will be assigned.
Cheating & Plagiarism	• Copying or letting someone copy your work on exams, assignments, or reports is cheating. • Cutting and pasting text, figures and tables from web sources or any other electronic source is plagiarism. • The consequence of academic dishonesty is to receive a grade of **FF** for the course.
Evaluation	Midterm 40% Final Exam 60% Total 100%

Instructor

Name/Surname	Akın Uslu	Email	akin.uslu@alanya.edu.tr
Room	209	Office Hours	W 11.30-12.30 | F 13.30-14.30

Prepared by Akın Uslu on june 10th, 2024.