Faculty of Eng. & Natural Sci.

EE571-202201

Linear Systems

Instructor

Name	Email	Office	Phone	Web	Office Hours
Mustafa Ünel	munel@sabanciuniv.edu	FENS-1066	9549	http://people.sabanciuniv.edu/munel	Before and after classes, or by appointment.

Course Content

Gives the fundamental theory of linear dynamical systems in both continuous and discrete time. The course covers state- space representations, vector spaces, linear operators, eigenvalues and eigenvectors, functions of vectors and matrices, solutions to state equations, stability, controllability, observability, realization theory, feedback and observers.

Objectives

This course is intended for first year graduate students to present the fundamental concepts of the linear systems theory.

Recommend or Required Reading

Textbook

- Chen, C.-T., Linear System Theory and Design, 3rd Edition, Oxford University Press, 1999

Readings

- Rugh, J. W., Linear System Theory, 2nd Edition, Prentice-Hall, 1996
- Antsaklis, P. J., Michel A. N. Linear Systems, Birkhouser, 2006

Assessment Methods and Criteria

	Percentage (%)	Number of assessment methods
Final	45	
Midterm	40	1
Homework	15	6

Course Outline

- Introduction and Overview
- Mathematical Descriptions of Systems
- Linear Algebra Review
- State Space Solutions and Realizations
- Stability
- Controllability and Observability
- Minimal Realizations
- State Feedback and State Estimators

Learning Outcomes

After taking this course, a successful graduate student must have a solid background in linear system theory which can be applied to many engineering problems such as control, signal processing, vision and robotics. In particular, students should be able to:

- Classify systems and develop Input/Output and State-Space representations for systems
- Use vector space ideas, matrices and their functions
- Check controllability and the observability of a linear system
- Check the external and the internal stability of a system
- Design linear state feedback control
- Estimate states of a dynamical system using various observers

Course Policies

- Cheating is absolutely subject to a disciplinary action and a null grade.
- Make-up only for official excuses.