



## Faculty of Eng. & Natural Sci.

EE571-202001

Linear Systems

### Instructor(s)

Name	Email	Office	Phone	Office Hours
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### Course Content

The course gives the fundamental theory of linear dynamical systems in both continuous and discrete time. It 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, Birkhauser, 2006

## 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
- Pole Placement and Model Matching

## 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 in 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

## Assessment Methods and Criteria

	Percentage(%)	Number of assessment methods
Final	35	
Midterm	35	1
Homework	30	6

## Course Policies

- Midterm and Final Exams will be given as Take-Home Exams.
- Cheating is absolutely subject to a disciplinary action and a null grade.
- Make-up only for official excuses.