Faculty of Eng. & Natural Sci.
EE571-202001
Linear Systems

Instructor(s)

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Office</th>
<th>Phone</th>
<th>Office Hours</th>
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<tbody>
<tr>
<td>Mustafa Ünel</td>
<td><a href="mailto:munel@sabanciuniv.edu">munel@sabanciuniv.edu</a></td>
<td>FENS</td>
<td>***0549</td>
<td>Please send email for online appointments.</td>
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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


Readings

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

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<tr>
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<th>Percentage(%)</th>
<th>Number of assessment methods</th>
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<tbody>
<tr>
<td>Final</td>
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<td></td>
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<tr>
<td>Midterm</td>
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<td>1</td>
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<tr>
<td>Homework</td>
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<td>6</td>
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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.