Faculty of Eng. & Natural Sci.

EE524-202301
Digital Control Systems

Instructor(s)

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Office</th>
<th>Phone</th>
<th>Web</th>
<th>Office Hours</th>
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</thead>
<tbody>
<tr>
<td>Kemalettin Erbatur</td>
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<td>Via appointment by e-mail.</td>
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Course Content

Mathematical background, discrete equivalents to continuous transfer function, direct digital control and supervisory control, control strategies process modelling and identification quantization effect, implementation issue in digital control

Objectives

Detailed study on the theory and methods for controllers implemented on digital computers.

Recommend or Required Reading

Textbook

Authors: Gene F. Franklin, J. David Powell, Michael L. Workman

Readings

Katsuhiko. Ogata, Discrete-Time Control Systems, Prentice-Hall
Assessment Methods and Criteria

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<th>Percentage(%)</th>
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Course Outline

1. Introduction
   - Problem Definition
   - Overview of Design Approach

2. Review of Continuous Control
   - Dynamic Response
   - Differential Equations
   - Laplace Transforms and Transfer Functions
   - The Final Value Theorem
   - Response versus Pole Locations
   - Time-Domain Specifications
   - Basic Properties of Feedback
   - Stability
   - Steady-State Errors
   - PID Control
   - Root Locus
   - Frequency Response Design
   - Specifications
   - Bode Plot Techniques
   - Stability Margins
   - State-Space Design
   - Estimator Design
   - Reference Input
   - Integral Control

3. Introductory Digital Control
   - Digitization
   - Effect of Sampling
Learning Outcomes

On successful completion of the course, students will be able to:
Use various mathematical tools for modeling and analysis of discrete and sampled-data systems.
Synthesize digital controllers based on discrete approximation of continuous controllers (emulation)
Synthesize direct digital controllers using root locus, frequency domain and state-space design methods
Effect of sampling and quantization on the overall performance of a control system

Course Policies

This is a physical-only course.
Attendance to a minimum of 70% of lectures is required to be admitted to the final exam.
More than 70% attendance earns participation points.
Pop quizzes.
Closed book, closed notes, no electronics written exams.