

## ME-303: Control System Design

Instructor(s): Melih Turkseven

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Office Hours: TBD, or by appointment

**Course Content:** This course introduces fundamental approaches to control system design. Specific topics include design in frequency domain; design using the Root Locus; design of state variable feedback systems; controllability; observability; pole placement using state feedback; limitations of state variable feedback; state observers; the design of robust control systems.

**Objectives:** To enable students to understand why automatic control is useful, recognize the value of integrated control and process design, identify when a process is easy or difficult to control, learn key ideas and concepts in dynamics and feedback, grasp relevant mathematical theory, be able to solve some important control problems and recognize difficult ones, and be aware of computational tools.

**Textbook:** G.F. Franklin, J.D. Powell and A. Emami-Naeni: Feedback Control of Dynamic Systems (6th or 7th Edition), Prentice Hall.

### Course Outline:

**Week 1** Motivation for applying Feedback Control

**Week 2** Mathematical preliminaries, Dynamic Models & Dynamic Response

**Week 3** Basic Properties of Feedback

**Week 4** Digital Controller Implementation

**Week 5-6** The Root-Locus Design Method

**Week 7** Review and Midterm Exam Recitation Q&A

**Week 8-12** Modern Control: Controller Design using State-Space

**Week 13-14** The Frequency-Response Design Method

**Grading:** Final: %30 Midterm: %30 Homework/Reports: %30 Attendance: %10

### Important Notes:

- There will be 3 lab sessions. Labs will be held on campus and attendance to labs is mandatory!
- To qualify for make-up the average score on homework assignments should be at least 20 out of 100.
- Any possible make-up exam will be scheduled at the end of the semester. In fairness to those who take the original exam, the make-up will include all the topics covered at the time of the exam.
- All the excuses for missing an exam and associated medical reports must be submitted before the exam. In case of an emergency during the exam, a medical report from Medline must be obtained immediately.