

E E 557 A Wi 25: Dynamics Of Controlled Systems

Course Logistics:

Date: Tuesdays 6:00pm – 8:50pm

Room: ECE 003

Instructor: Prof. Nagel (nnagel@uw.edu)

Assistant: Joseph Sullivan

Joseph Sullivan's Office Hours:
Wednesday 5:00pm - 6:00pm (virtual)

Course Purpose:

The objectives of this course are to present a systematic approach to control system design. It is the intent to do so in a physically insightful method using mathematics as a tool to analyze real world systems as opposed to homework exercises. We will explore systems in multiple domains (mechanical, electrical, thermal) and see the parallels between them. This course presents an intuitive, physics based approach to control systems.

Course Description:

Throughout the course, students will demonstrate an understanding of the analysis and results of homework problems. Each assignment will have clearly written requirements associated with it. There is no assigned textbook for the class. All material needed will be presented in the lectures. A basic course in control systems theory is a prerequisite.

Learning Objectives:

At the completion of this course, students will be able to:

1. Enhance the dynamic stiffness of control systems.
2. Design appropriate command feedforward for high performance command tracking.
3. Decouple undesirable physical system properties:
 - Coupled manipulated inputs
 - Disturbance inputs
 - Virtual zero references
 - Coupled state feedback
4. Enhance desirable physical system properties:
 - Stiffness
 - Damping
5. Form observers for state estimation with zero-lag properties

Course Requirements

Required Texts

- No required texts

Optional Texts – any classical text such as:

- Automatic Control Systems by Benjamin C. Kuo
- Control Systems Engineering by Norman S. NiseModern
- Control Engineering by Katsuhiko Ogata

Required Course Material/Software

- Math Package (Matlab, MathCad, Mapple, Mathematica, etc.)

Prerequisites: ECE 447 or similar, or consent of instructor

Course Grading Breakdown:

Homeworks - 80%

Final Exam - 20%