ECE 3550 Syllabus

Feedback Control Systems ECE 3550, Section QUP, 3 Credits

Summer 2026

Instructor Information

Instructor: Jeffery Hurley

Email: jhurley@gatech.edu

General Course Information

Description

This course provides a comprehensive introduction to the analysis and design of feedback control systems. Students will develop the mathematical foundations necessary to model, analyze, and design control systems for a variety of engineering applications. Topics include system dynamics, Laplace transforms, transfer functions, stability analysis, and graphical design techniques including root locus and frequency response methods.

Emphasis is placed on understanding the fundamental principles of feedback and how they enable systems to achieve desired performance specifications including tracking accuracy, disturbance rejection, and stability margins. The course bridges theoretical foundations with practical engineering applications through problem sets and design exercises.

Course Learning Outcomes

Upon successful completion of this course, students will be able to:

Demonstrate thorough knowledge of the concept of system dynamics.

Demonstrate an understanding of the concept of feedback and its application to control systems.

Analyze signals commonly arising in control applications and derive their Laplace transforms.

Apply the concepts of system response (including transients and steady-state) and of system stability.

Apply the principles of feedback control in a broad context of engineering systems.

Design control systems for steady-state tracking of reference inputs, disturbance rejection, and sensitivity reduction.

Apply graphical design techniques (root locus plots, Bode plots, Nyquist plots) to control systems analysis and design.

Required Course Materials

Textbook: *Feedback Control of Dynamic Systems*, 8th Edition, by Gene F. Franklin, J. David Powell, and Abbas Emami-Naeini. Pearson, 2019. ISBN: 978-0134685717

Software: MATLAB with the Control System Toolbox is required for homework assignments. MATLAB is available to all Georgia Tech students through the Office of Information Technology.

Grading Policy:

Eight Homework Assignments 30%; Two Exams 40% Final exam 30%.

A>90; B>80; C>70; D>60

Assignments

- Homework 1, 3%
- Homework 2, 3%
- Homework 3, 4%
- Homework 4, 4%
- Homework 5, 4%
- Homework 6, 4%
- Homework 7, 4%
- Homework 8, 4%
- Exam 1, 20%
- Exam 2, 20%
- Final exam, 30%

Description of Graded Components

There is a homework assignment for each of the major topics covered. All exams are closed-book with a provided formula sheet. Scientific calculators are permitted; graphing calculators and electronic devices capable of symbolic computation or communication are prohibited. Make-up exams require prior approval or documented emergency circumstances. The final exam is comprehensive, covering all course material.

Course Policies

Attendance and/or Participation

This will be an active classroom, where you will be expected to participate. I have noticed a drastic difference in the performance between students who regularly attend class and participate compared to those who don't. Therefore, course attendance and participation is considered when determining your final grade.

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review Georgia Tech's Honor Code and the student Code of Conduct.

Any student suspected of cheating or plagiarism on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Core IMPACTS

This course does not count towards a Core IMPACTS area.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (404-894-2563) as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Student-Faculty Expectations Agreement

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. The Student-Faculty Expectations articulate some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

Pre- &/or Co-Requisites

None.

Collaboration, Group Work, and Use of Generative AI

You are allowed to consult with other students on all homework assignments, but any work you turn in must be written in your own hand.

Extensions, Late Assignments, & Re-Scheduled/Missed Exams

Late homework will be accepted with a 20% penalty per day for up to two days; no credit after two days. Homework extensions are given for illness, approved Institute activities or religious observances.