ME 4452 – Control of Dynamic Systems

Fall 2026, Section A, CRN 83435

School of Mechanical Engineering, Georgia Institute of Technology

Instructor Information

Instructor: Dr. Jun Ueda

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General Course Information

Course Description

This course introduces fundamental principles and methods for the analysis and design of feedback control systems. Emphasis is placed on modeling and control of linear dynamic systems using both time-domain and frequency-domain techniques. Topics include system modeling, time and frequency response analysis, stability, root locus, state-space methods, and an introduction to digital control systems.

Course Learning Outcomes

By the end of this course, students should be able to:

- Model engineering dynamic systems using differential equations, transfer functions, and state-space representations.
- Analyze transient and steady-state behavior of linear dynamic systems.
- Evaluate system stability using time-domain and frequency-domain methods.
- Design feedback controllers using root locus, frequency-response, and state-space techniques.
- Assess control system performance through analysis and simulation.

Required Course Materials

- Nise, S. Norman, *Control Systems Engineering*, 6th Edition, Wiley, 2010.
- MATLAB software (required for homework assignments and projects).

Grading Policy

Graded Component	Points	Percentage
Problem Sets (4 × 50 pts)	200	20%
Midterm Exams (2 × 200 pts)	400	40%
Final Exam	250	25%
Computer Project (HW5)	150	15%
Total	1000	100%

Guaranteed Letter Grades:

A ≥ 90% B ≥ 80% C ≥ 70% D ≥ 65% F < 65%

Students who score below 50% on the final exam may be considered for failure regardless of overall course average.

Description of Graded Components

- **Problem Sets:** Five problem sets will be assigned during the semester and are due at the start of class on the specified due date.
- **Midterm Exams:** Two in-class midterm examinations covering designated course topics.
- **Final Exam:** Comprehensive final examination covering all material.

All exams are closed book and notes. Students may bring handwritten note sheets as specified for each exam. Calculators are permitted. MATLAB will not be used during exams.

Course Policies

Attendance and/or Participation

This will be an active classroom, where you will be expected to participate. I have observed a significant difference in exam performance between students who regularly attend class and those who do not. Therefore, attendance may be considered in 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. You are responsible for reviewing and complying with 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, which will investigate the incident and determine the appropriate penalty for violations.

Core IMPACTS

Core IMPACTS is the University System of Georgia's General Education curriculum. If this course counts toward a Core IMPACTS area, a syllabus statement addressing the applicable Core area and associated career competencies will be provided. Instructors may adapt appropriate template language developed by the Center for Excellence in Teaching and Learning and Online Education at Georgia State University.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, please contact the Office of Disability Services (404-894-2563) as soon as possible to make an appointment to discuss your needs and obtain an official accommodations letter.

Please also email me as early as possible so that we may arrange appropriate accommodations.

Student–Faculty Expectations Agreement

At Georgia Tech, we strive to foster an atmosphere of mutual respect, acknowledgment, and responsibility between faculty members and students. The Student–Faculty Expectations Agreement outlines basic expectations that you may have of me and that I have of you. Respect for knowledge, hard work, and professional interaction is essential to creating a productive learning environment, and I encourage you to remain committed to the ideals of Georgia Tech throughout this course.

Pre- and/or Co-Requisites

ME 3017 (System Dynamics) or equivalent is a prerequisite.

Collaboration, Group Work, and Use of Generative AI

You are permitted to work in groups on all homework and out-of-class assignments (and you may consult my posted solutions), but all submitted work must be written independently and reflect your own understanding. In-class tests and exams must be completed individually. All in-class tests and exams are closed book and notes; however, an equation sheet will be provided.

Extensions, Late Assignments, and Re-Scheduled or Missed Exams

Late homework submissions will be penalized according to the course late policy. Make-up or re-scheduled exams will be granted only in cases of documented illness, approved Institute activities, or religious observances, and must be coordinated with the instructor as early as possible.

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 as outlined in the Georgia Tech Honor Code and Student Code of Conduct. Any instances of academic misconduct will be reported to the Office of Student Integrity.

Students with Disabilities

Students who require accommodations should contact the Office of Disability Services as early as possible and provide the instructor with an official accommodations letter.

Student–Faculty Expectations

The Student–Faculty Expectations Agreement outlines mutual responsibilities and expectations that promote a respectful and productive learning environment. Students are encouraged to review and uphold these standards throughout the course.

Prerequisites and Corequisites

Prerequisite coursework in system dynamics or equivalent analytical background is expected.

Course Website

Course materials, announcements, assignments, and solutions will be posted on the official course site (CANVAS). Students are responsible for regularly checking the website for updates.