Mechanical Engineering Department
ME 483
Control Systems, Spring 2025

Course: ME 483 Control Systems

Professor:
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ME 483 B: Eui-Hyeok (E.H.) Yang, Ph.D. e-mail: eyang@stevens.edu[1]

TAs:
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Lecture:

ME 483 A:	Tue & Thu	12:30pm – 1:45pm	Gateway South 122
ME 483 B:	Tue & Thu	3:30pm – 4:45pm	Gateway South 216

Prompt attendance is required.

Textbooks: Required**:** *Control Systems Engineering, 8th* or *7th Ed.* by Norman S. Nise (Wiley)
ISBN : 978-1-119-59292-1, *8th Ed.* | ISBN : 978-1-118-17051-9, *7th Ed.*

Software: Canvas, Mathworks *MATLAB*, and associated tools

Description: Analysis and synthesis of single-input, single-output (SISO) linear time invariant (LTI) feedback control systems. Laplace transforms, transfer functions, poles and zeros, block diagrams, time response, and frequency response. Performance criteria, multi-domain systems modeling, Routh-Hurwitz stability, root-locus, Bode plots, stability margins, compensator design, applications relevant to mechanical engineers.

Topics:
1. Laplace Transforms of systems
2. Modeling of electrical & mechanical systems in the frequency (Laplace) domain
3. System response and characterization
4. Block diagram development and analysis
5. Stability and Routh-Hurwitz techniques
6. Root Locus analysis and design
7. PID, Lead-Lag compensators
8. Bode plots
10. Gain and phase (stability) margins

All information in this syllabus is subject to change in the event of a shift to hybrid or online learning.

Interaction: e-Mail

- Course-related correspondence with the professor and/or TA should be made *via e-mail* (not Canvas). E-mails must include the course number **ME 483** in the e-mail subject line. Messages without the course number in the subject line ***may go unanswered***.
- Students are expected to check email at minimum twice daily (morning and evening).

Lecture Notes: Partial lecture materials may be posted to Canvas that will *purposefully* omit certain solutions / details that are reserved for discussion during class. It is the *responsibility of each student* to take appropriate notes during class to reinforce the material.

Materials: Under no circumstances may students reproduce or post any course materials (slides, homework problems / solutions, quiz problems / solutions, video recordings, etc.) to any website or service. Similarly, students may not copy solutions from websites, services, peers, or other sources for any coursework. Violation of this policy constitutes an actionable violation of the Stevens Honor Code as well as an actionable violation of intellectual property rights. Please maintain academic integrity throughout your courses.

[1] Correspondence with the professor and/or TAs should be made *via e-mail* (not Canvas) and ***MUST*** include the course number **ME 483** in the e-mail subject line. Messages without the course number in the subject line ***may go unanswered***.

Proposed Calendar (subject to change at any time):

Week 1	**Tue**	21-Jan	[01] Intro to Control Systems [02] Laplace Transforms and Transfer Functions	Nise 2.2 - 2.3
	Thu	23-Jan	"	
Week 2	**Tue**	28-Jan	[03] Modeling Electrical Circuits in the Freq. Domain	Nise 2.3 - 2.5
	Thu	30-Jan	[04] Modeling Translational Systems in the Freq. Domain	
Week 3	**Tue**	4-Feb	[05] Modeling Rotational Systems in the Freq. Domain	Nise 2.6 - 2.7
	Thu	6-Feb	"	
Week 4	**Tue**	11-Feb	[06] Modeling Combined Systems in the Freq. Domain	Nise 2.8
	Thu	13-Feb	"	
Week 5	**Tue**	18-Feb	**NO CLASS (Monday Schedule)**	
	Thu	20-Feb	**QUIZ (Topics 02 - 05)**	
Week 6	**Tue**	25-Feb	[07] Time Response of Linear Systems	Nise 4.2 - 4.6
	Thu	27-Feb	[08] Block Diagrams and System Reduction	Nise 5.2 - 5.3
Week 7	**Tue**	4-Mar	[09] Stability & Routh-Hurwitz Criterion	Nise 6.1 - 6.4
	Thu	6-Mar	" [10] Steady-State Errors	Nise 7.1 - 7.7
Week 8	**Tue**	11-Mar	"	
	Thu	13-Mar	**QUIZ (Topics 06 - 09)**	
			NO CLASSES (Spring Recess)	
Week 9	**Tue**	25-Mar	[11] Introduction to Root Locus (RL) Methods	Nise 8.1 - 8.5
	Thu	27-Mar	"	
Week 10	**Tue**	1-Apr	"	
	Thu	3-Apr	[12] Transient Response Design via RL	Nise 5.3, 8.6 - 8.7
Week 11	**Tue**	8-Apr	[13] Cascade Compensator Design via RL (part 1)	Nise 9.1 - 9.2
	Thu	10-Apr	[14] Cascade Compensator Design via RL (part 2)	Nise 9.3 - 9.4
Week 12	**Tue**	15-Apr	[15] Intro to Freq. Response Techniques	Nise 10.1 - 10.2
	Thu	17-Apr	" [16] Stability Margins	Nise 10.5 - 10.7
Week 13	**Tue**	22-Apr	**QUIZ (Topics 10 - 12)**	
	Thu	24-Apr	[17] Bode Plot Analysis	Nise 10.8, 10.10 - 10.11
Week 14	**Tue**	29-Apr	[18] Design via Freq. Response	Nise 11.2 - 11.4
	Thu	1-May	Project 2 work time	
Week 15	**Tue**	6-May	**QUIZ (Topics 15 - 18)**	
	Thu	8-May	**NO CLASS (Finals Period)**	

Grading:

Homework problem sets	10%
Quizzes	70%
Projects	20%

Late submissions may be penalized; submissions ***will not*** be accepted once related solutions are posted. Grading may only be disputed until 2 weeks after grades have been posted.

Homework: Binary grading scale (0 or 1):

- 0 if not submitted, submitted drastically incomplete, or barely attempted,
- 1 if a reasonable attempt was made on most problems and much seemed correct.
- ***Solutions will be provided after submission deadline for detailed student review.***

SHARING OR REDISTRIBUTING COURSE MATERIALS

Some lecture slides, notes, or exercises used in this course may be the property of the textbook publisher or other third parties. All other course material, including but not limited to slides developed by the instructor(s), the syllabus, assignments, course notes, course recordings (whether audio or video) and examinations or quizzes are the property of the University or of the individual instructor who developed them.

Students are free to use this material for study and learning, and for discussion with others, including those who may not be in this class, unless the instructor imposes more stringent requirements. Republishing or redistributing this material, including uploading it to web sites or linking to it through services like iTunes, violates the rights of the copyright holder and is prohibited. There are civil and criminal penalties for copyright violation.

Publishing or redistributing this material in a way that might give others an unfair advantage in this or future courses may subject you to penalties for academic misconduct.

TESTING CONDITIONS

The following procedures apply to in-person quizzes. In the event of a shift to online quizzes, these procedures may differ. For either in-person or online quizzes, the instructor reserves the right to modify any conditions set forth below by indicating revised conditions by e-mail or directly on the quiz.

(1) For non-multiple choice / non-short answer questions, please provide procedures or explanations yielding final answers. Credit *may* not be awarded if reasoning is not provided.

(2) Clearly circle problem solutions.

(3) Useful formulas and theorems are provided at the back of the quiz.

(4) A 2 sheet, double sided (4-sides of a page occupying 2 sheets) 8.5” x 11” hand-written original *cheat sheet* may be used. It must be submitted with the quiz.

(5) Calculators (NOT calculator apps) are permitted for performing numeric calculations.

(6) No materials or technologies may be shared during the quiz.

(7) Other than the *cheat sheet* and calculator specified above, the quiz is closed phone / software / internet / communication / technology / discussion.

(8) A ruler / straight edge / protractor is permitted for graphing / plot analysis.

(9) Reproduction, storage, or online posting of quiz problems is strictly prohibited.

(10) Timely submission of this quiz based on the indicated duration is required. Delayed submission may be penalized or counted as a zero grade.

Students **are not** permitted to work [or communicate] with other students during quizzes. Sharing of resources during quizzes is strictly prohibited. Copying, storing, reproducing, or posting quiz problems online is strictly prohibited.

Students who are granted learning accommodations must communicate with the professor to coordinate accommodations within a sufficient timeframe. This is the student’s responsibility.

ACADEMIC INTEGRITY

Undergraduate Honor System

Enrollment into the undergraduate class of Stevens Institute of Technology signifies a student's commitment to the Honor System. Accordingly, the provisions of the Stevens Honor System apply to all undergraduate students in coursework and Honor Board proceedings. It is the responsibility of each student to become acquainted with and to uphold the ideals set forth in the Honor System Constitution. More information about the Honor System including the constitution, bylaws, investigative procedures, and the penalty matrix can be found online at https://web.stevens.edu/honor/ .

The following pledge shall be written in full and signed by every student on all submitted work (including, but not limited to, homework, projects, lab reports, code, quizzes and exams) that is assigned by the course instructor. No work shall be graded unless the pledge is written in full and signed.

"*I pledge my honor that I have abided by the Stevens Honor System*."

Reporting Honor System Violations

Students who believe a violation of the Honor System has been committed should report it within ten business days of the suspected violation. Students have the option to remain anonymous and can report violations online at https://web.stevens.edu/honor/ .

LEARNING ACCOMODATIONS

Stevens Institute of Technology is dedicated to providing appropriate accommodations to students with documented disabilities. The Office of Disability Services (ODS) works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities, sensory impairments, psychiatric disorders, and other such disabilities in order to help students achieve their academic and personal potential. They facilitate equal access to the educational programs and opportunities offered at Stevens and coordinate reasonable accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from the ODS staff. The ODS staff will facilitate the provision of accommodations on a case-by-case basis.

Students who are granted learning accommodations must communicate with the professor to coordinate accommodations within a sufficient timeframe. This is the student's responsibility.

Disability Services Confidentiality Policy

Student Disability Files are kept separate from academic files and are stored in a secure location within the Office of Disability Services. The Family Educational Rights Privacy Act (FERPA, 20 U.S.C. 1232g; 34CFR, Part 99) regulates disclosure of disability documentation and records maintained by Stevens Disability Services. According to this act, prior written consent by the student is required before our Disability Services office may release disability documentation or records to anyone. An exception is made in unusual circumstances, such as the case of health and safety emergencies.

For more information about Disability Services and the process to receive accommodations, visit https://www.stevens.edu/directory/office-disability-services . If you have any questions please contact: Phillip Gehman, the Director of Disability Services Coordinator at Stevens Institute of Technology at pgehman@stevens.edu or by phone (201) 216-3748.

INCLUSIVITY

Name and Pronoun Usage

As this course includes group work and class discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect. This includes the ability for all students to have their chosen gender pronoun(s) and chosen name affirmed. If the class roster does not align with your name and/or pronouns, please inform the instructor of the necessary changes.

Inclusion Statement

Stevens Institute of Technology believes that diversity and inclusiveness are essential to excellence in academic discourse and innovation. In this class, the perspective of people of all races, ethnicities, gender expressions and gender identities, religions, sexual orientations, disabilities, socioeconomic backgrounds, and nationalities will be respected and viewed as a resource and benefit throughout the semester. Suggestions to further diversify class materials and assignments are encouraged. If any course meetings conflict with your religious events, please do not hesitate to reach out to your instructor to make alternative arrangements.
You are expected to treat your instructor and all other participants in the course with courtesy and respect. Disrespectful conduct and harassing statements will not be tolerated and may result in disciplinary actions.

MENTAL HEALTH RESOURCES

Part of being successful in the classroom involves a focus on your whole self, including your mental health. While you are at Stevens, there are many resources to promote and support mental health. The Office of Counseling and Psychological Services (CAPS) offers free and confidential services to all enrolled students who are struggling to cope with personal issues (e.g., difficulty adjusting to college or trouble managing stress) or psychological difficulties (e.g., anxiety and depression). CAPS is open daily from 9:00 am – 5:00 pm M-F. Evening hours are available by appointment in the Fall / Spring semesters and up-to-date information regarding the availability of evening appointments can be found by visiting www.stevens.edu/CAPS. To schedule an appointment, call 201-216-5177.
Due to the pandemic, in-person appointments may be limited until further notice. Up-to-date information about the availability of in-person services can be found at www.stevens.edu/CAPS. Teletherapy (therapy via secure video platform) is available to registered students physically located in the states of New York or New Jersey. Students located outside of NY / NJ are encouraged to pursue local treatment through their personal health insurance. To learn more about the process of finding a therapist please visit the CAPS webpage on Seeking Help Off-Campus.

EMERGENCY INFORMATION

In the event of an urgent or emergent concern about the safety of yourself or someone else in the Stevens community, please immediately call the Stevens Campus Police at 201-216-5105 or on their emergency line at 201-216-3911. These phone lines are staffed 24/7, year round. For students who do not reside near the campus and require emergency support, please contact your local emergency response providers at 911 or via your local police precinct. Other 24/7 national resources for students dealing with mental health crises include the National Suicide Prevention Lifeline (1-800-273-8255) and the Crisis Text Line (text “Home” to 741-741). If you are concerned about the wellbeing of another Stevens student, and the matter is *not* urgent or time sensitive, please email the CARE Team at care@stevens.edu. A member of the CARE Team will respond to your concern as soon as possible.