MECH 3340
System Dynamics Modeling and Analysis

Term	Fall Semester 2023
Lecture Time	Monday & Wednesday: 2:30pm – 3:45pm
Lecture location	ECSW 3.250
Website	UT Dallas eLearning: https://elearning.utdallas.edu/

These descriptions and timelines are subject to change at the discretion of the Professor

Professor Contact Information

Dr. Armin Zare

Office location	ECSW 3.355C
Email address	armin.zare@utdallas.edu
Office hours	in person: Monday 4:00pm – 5:00pm online: set appointment by emailing professor

General Course Information

Semester Credit Hours	3
Pre-requisites	MECH 3315 Fluid Mechanics
Other Restrictions	None
Instructional Modality	Face-to-Face
Course Platform	Course material including lecture slides, homework assignments and solutions, and exams will be routinely posted on eLearning. **Please check it frequently.**
Catalog Description	Dynamic analysis and simulation of common engineering systems with thermal, fluid, mechanical and electromechanical applications. Laplace transform techniques, time domain, and frequency response methods are used along with simulation techniques to analyze and predict system response to various input stimuli. Matlab and Simulink are used extensively throughout the course. Students are expected to be familiar with linear algebra, differential equations, fluid dynamics, heat transfer, spring-mass-damper mechanical systems, and resistor-inductor-capacitor electrical systems.
Course Outline	• ODEs, complex numbers, Laplace transforms, Transfer functions • Block diagrams, State-space • Fluid/Thermal systems • 1st order systems • Mechanical systems • Electrical systems • 2nd order systems • Numerical methods

- Frequency domain analysis
- Bode plots
- Ethics in modeling

Learning Objectives

The learning objectives/outcomes for this course are as follows:

- Derive sets of equations that govern the dynamic behavior of common engineering systems.
- Solve for steady-state and transient responses of linear systems subject to various stimuli in both the time and frequency domains.
- Use Matlab/Simulink as a tool to verify analysis and numerically simulate systems with common non-linearities.
- Demonstrate the ability to evaluate ethical behavior in engineering modeling and the impacts of misusing system models and the data they produce.

Reference Text

System Dynamics, 4th edition; William Palm; ISBN 978-0-07-814005-1
Note: The 3rd edition is similar but may not have the same problem numbers and examples. A hard copy of the textbook is not required.

Course Policies

Grading Distribution

Homework (40%)
Midterm exam 1 (20%)
Midterm exam 2 (20%)
Optional final exam (20% in lieu of one of the midterm exams)
Class participation (10%)
In-class quizzes (10%)

You have five business days to appeal any assigned grade. After this point, neither grades nor the grading weights will be changed. Your final grade will be rounded to the nearest whole number, based on the following ranges:

	Plus (+)		Minus (-)
A	[97-100]	[93,97)	[90,93)
B	[87,90)	[83,87)	[80,83)
C	[77,80)	[73,77)	[70,73)
D	[67,70)	[63,67)	[60,63)
F		Below 60	

Homework and Laboratory Assignments

- Homework will be assigned via eLearning. You will receive an email announcing new assignments and their availability in the 'Homework' folder on eLearning.
- Homework assignments are due on the date and at the precise time written at the top of the assignment document. Late homework will not be accepted under any circumstances. To receive credit for homework, your solutions must be neat and organized. You will submit your completed homework via eLearning by attaching a **single PDF file** containing scans/pictures of your hand-written solutions.
- The lowest homework grade will be disregarded in the final grade.

- Moderate collaboration with your classmates is allowed. However, I expect you to spend time to understand homework problems and laboratory assignments and independently write the solutions and reports that you turn in. **Students are not allowed to use any homework solutions obtained from former students, online, or any other source. Cheating or plagiarizing are absolutely unacceptable and will be referred to the Office of Judicial Affairs** (see https://www.utdallas.edu/conduct/manage-dishonesty/) If it is determined that academic dishonesty occurred, you will receive a grade of **F** in this course.

Exams

- Midterm exam schedule: Wednesday Oct 11th, 2023 (format: in class).
- Midterm exam schedule: Wednesday Nov 15th, 2023 (format: in class).
- Optional Final exam schedule: TBA (format: in class). This will be an optional exam. If a student chooses to take this exam, their grade will replace the minimum grade of Exams 1 and 2.
- **No make-up exams will be given.** In the event of an excused absence (illness, job-related travel, holy day absence, etc.; Proper documents should be provided), the weight of the exam will be shifted to the remaining exams.

Class Attendance

The University's attendance policy requirement is that individual faculty set their course attendance requirements. Regular and punctual class attendance is expected. Students who fail to attend class regularly are inviting scholastic difficulty. In some courses, instructors may have special attendance requirements; these should be made known to students during the first week of classes. Faculty have the discretion to set an attendance policy for their in-person meetings, but the absences due to COVID-19 cannot be counted against a quarantined student.

Class Participation

Regular class participation is expected. Students who fail to participate in class regularly are inviting scholastic difficulty. A portion of the grade for this course is directly tied to your participation in this class. It also includes engaging in group or other activities during class that solicit your feedback on homework assignments, readings, or materials covered in the lectures (and/or labs). Class participation is documented by faculty. Successful participation is defined as consistently adhering to university requirements, as presented in this syllabus. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Class Recordings

Students are expected to follow appropriate University policies and maintain the security of passwords used to access recorded lectures. Unless the Office of Student AccessAbility has approved the student to record the instruction, students are expressly prohibited from recording any part of this course. Recordings may not be published, reproduced, or shared with those not in the class, or uploaded to other online environments except to implement an approved Office of Student AccessAbility accommodation. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

The instructor may record meetings of this course. These recordings will be made available to all students registered for this class if the intent is to supplement the classroom experience. If the instructor or a UTD

school/department/office plans any other uses for the recordings, consent of the students identifiable in the recordings is required prior to such use unless an exception is allowed by law.

Class Materials

The instructor may provide class materials that will be made available to all students registered for this class as they are intended to supplement the classroom experience. These materials may be downloaded during the course, however, these materials are for registered students' use only. Classroom materials may not be reproduced or shared with those not in class or uploaded to other online environments except to implement an approved Office of Student AccessAbility accommodation. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Comet Creed

This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:

"As a Comet, I pledge honesty, integrity, and service in all that I do."

Academic Support Resources

The information contained in the following link lists the University's academic support resources for all students. Please see http://go.utdallas.edu/academic-support-resources.

UT Dallas Syllabus Policies and Procedures

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus. Please review the catalog sections regarding the credit/no credit or pass/fail grading option and withdrawal from class.

Please go to http://go.utdallas.edu/syllabus-policies for these policies.