AE 3530 – System Dynamics and Vibrations

Course Syllabus

Summer Semester (Limerick) 2026

CLASS SCHEDULE

Lecture: 10 am-12 pm, Monday-Thursday

INSTRUCTORS

Dr. Jonathan Rogers, Professor, School of Aerospace Engineering
Office: Montgomery Knight 421B
Office Hours: TBD
Email: jonathan.rogers@ae.gatech.edu

Normally office hours will be held in person. Occasionally office hours will be virtual at the following link:
https://gatech.zoom.us/j/2499414718?pwd=NXg4VkJnVjVqcWVaM2lqSDhxTVE5Zz09

COURSE DESCRIPTION

Modeling and analysis of lumped- and distributed-parameter systems, free and forced vibration in mechanical systems, free vibration in structural systems.

PREREQUISITE COURSES

AE2220 Dynamics
Math 2552 Differential Equations

COURSE TEXTBOOK

The official textbook for this course is:

Ogata, Katsuhito, System Dynamics 4th Edition, Pearson, 2003.

It is highly recommended that students buy this book, but it is not strictly required. You will find it useful as a reference for additional reading throughout the semester and your career.

COURSE OBJECTIVES

Provide students with a foundational understanding of dynamic modeling and analysis of both lumped parameter (mechanical) systems and distributed parameter (structural) systems, and free and forced vibration response of those systems.

Students will gain mastery level understanding of:
1) Modeling of Physical Systems
2) Distributed parameter systems versus lumped parameters
3) Response of 1st and 2nd Order Dynamic Systems
4) Mode shapes, natural frequencies and expansion theorem (modal superposition)

Students will gain basic capability or understand of:
5) Response of Higher Order Dynamic Systems
6) Free Vibrations (free and forced)

GRADING

Grades will be determined based on demonstrated proficiency on homework sets and a final examination. The points associated with each graded event are shown below along with the associated letter grade. Note that this course is not graded on a curve. **The instructor reserves the right to increase or decrease the number of assignments and adjust the point totals below accordingly as the semester progresses.**

Point Breakout:

Homework Sets (4)	= 450 points
Final Exam	= 250 points
Total	**= 700 points**

Class participation: +, 0, -

Grading Scale:

A = 630-700 Total Points
B = 560-630 Total Points
C = 490-530 Total Points
D = 420-490 Total Points
F = 0-419 Total Points

Occasionally, students will be offered the opportunity to obtain extra credit points. These points are added to the student's total while the total points for the course remains at 700.

In borderline cases, the class participation score will be used to influence the final grade.

HOMEWORK SETS

Several homework sets will be issued during the semester. These problem sets are intended to deepen understanding of the material. Unless stated otherwise, homework sets are to be submitted before class begins on the due date. **Students are permitted to turn in 1 homework set up to 3 days late with no justification necessary. Otherwise, homework sets will not be accepted late.**

Homework should be submitted online. Draw a box around the final answer, and include proper units.

A sufficient amount of work must be shown for each problem on the homework. If sufficient work is not shown, points will be taken off.

ADDITIONAL INSTRUCTION

Supplemental instruction by the instructor is a valuable resource available to any student having difficulty with a particular concept in the course. Get help when you have a problem! Be prepared to ask specific questions about concepts that are confusing or unclear. **Students are highly encouraged to attend office hours as it may take me a while to answer questions via email given our compressed summer schedule.**

OTHER CLASS POLICIES

Attendance: Class attendance is required. In previous classes there has been a strong correlation between students who received good grades and students who attended class regularly.

Cell Phones and Electronic Devices: Cell phones and computers ***should not be out during class***.

Students with disabilities will receive necessary accommodations. For details, please refer to the GT Disabilities Services' "Policies and Procedures" page located at this link: http://disabilityservices.gatech.edu/content/15/policies-procedures.

ACADEMIC DISHONESTY

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.

AI POLICY

Generative AI-based assistance, such as, but not limited to ChatGPT and Copilot, is comparable to collaboration with other people – for an individual assignment the use of generative AI is a violation of the Honor Code.

This course is designed to teach you how to do technical writing, coding, and analysis, so all work you submit must be your own. You should never include in your assignment anything that was not written directly by you without proper citation (including quotation marks and in-line citation for direct quotes). This includes code written by AI that was used to generate results for an assignment, or using AI to assist in the writing of code.

Inclusion of anything you did not write in your assignments (prose or code) without proper citation will be treated as an academic misconduct case. If you are unsure if you have gone to far consider these two simple guidelines: (1) avoid hitting "copy" in a conversation with an AI assistant; (2) do not have both your assignment and the AI agent open at the same time. Avoid using tools that directly add content to your submission. Use of spell and grammar checkers are acceptable (and encouraged) for all assignments.

You MUST adhere to Georgia Tech's rules regarding the use of AI in courses. Here is the link to the current policy:

https://oit.gatech.edu/ai/guidance

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.