ME 405 - Mechanical Vibrations
Fall 2023-2024
Syllabus

Course Instructor
Bekir Bediz
Mechatronics Engineering
Office: FENS 2080
E-mail: bbediz@sabanciuniv.edu
Office Hour: Tuesday 15:00-16:00

Course Assistant
Kazi Sher Ahmed
Mechatronics Engineering
Office: FENS G064
E-mail: kazisherahmed@sabanciuniv.edu
Office Hour: TBA

Course Schedule
Lecture:
Tuesday: 16:40 - 17:30 @ FENS G015
Thursday: 14:40 - 16:30 @ FENS G018

References
There is no specific textbook for the material presented in this course. Students are recommended to follow the references occasionally:


Purpose of the Course:
This course is designed both for undergraduate and graduate students. It is aimed to teach the fundamental concepts how systems vibrate. Fundamental aspects of vibrations for mathematical modeling, derivation/solution of equations of motion, and subsequent system analysis will be covered for discrete systems.

Objectives:
After the course, the students should be able to

- have a basic understanding of the fundamental approaches to mathematical modeling and derivation of equations of motions for modeling vibration behavior of mechanical systems.
- have a basic understanding of the characteristics of vibratory systems.
- model discrete systems including single- and multi-degree of freedom systems.
- outline the properties of natural frequencies and mode shapes, and perform modeling through modal analysis.

Course Content
- Basic concepts of vibrations
- Analysis of single degree of freedom (SDOF) systems by using complex vector representation
- Vibration measurement, vibration measuring devices and vibration criteria
- Frequency Response Functions (FRF) and system identification
- Response of SDOF to periodic excitation
- Response of SDOF to non-periodic excitation
- Free vibration of multi degree of freedom (MDOF) systems
- Harmonic response of multi degree of freedom (MDOF) systems
**Grading Policy**

For undergraduate students:
Homework (30%), Midterm (30%), Final Exam (40%)

For graduate students:
Homework (15%), Midterm (25%), Project (30%), Final Exam (30%)

- Zero credit for late homework unless arrangements are made in advance. You can discuss the problems with your classmates but copying work is against University regulations.

- One make-up examination, covering the whole course material, will be given after the final/oral exam date for the students who missed the midterm and/or final examination due to a valid excuse approved by the faculty/medical center. All examinations will be closed book and notes. The necessary formula will be provided to the students.

- All solutions (homework, exam) must be written in a professional manner. You may lose points for poorly written answers.

- No extra homework/exam/project/etc. will be given to increase your grade at the end of the semester.

- Students who miss any of the exams will get N/A from the course.

**Disclaimer**

Time conflict requests can be accepted for one hour only (both for lectures and recitations). Students who are registered to the course with time-conflict override accept the responsibility of any inconvenience that might occur due to missed content and/or quizzes. No make-up will be available for missed quizzes/content. To get approval for time conflict, you need to send an e-mail stating you are aware of these facts and you accept the responsibility.

**Academic Integrity**

Students are expected to be familiar with and comply with Sabanci University Academic Integrity Statement. Any form of academic dishonesty (plagiarism, copying/using other people’s work, attending classes/exams on behalf of other people, etc.) will be penalized with a failing grade for the related assignment, quiz, or exam and disciplinary actions will be taken.