

ME 405 - Mechanical Vibrations
Spring 2020-2021
Syllabus

COURSE	Bekir Bediz		
INSTRUCTOR	Mechatronics Engineering Office: FENS 2080	E-mail: Office Hour:	bbediz@sabanciuniv.edu Tuesday 11:00 - 12:00
COURSE ASSISTANT	Mir Meysam Rafiei Anamagh Mechatronics Engineering Office: FENS G064	E-mail: Office Hour:	mirmeysamr@sabanciuniv.edu TBA
COURSE SCHEDULE	<u>Lecture:</u> Monday : 15:40 -17:30 @ Zoom (Meeting ID: 990 8970 9144, Passcode: MechVib) Wednesday : 11:40 - 12:30 @ Zoom (Meeting ID: 990 8970 9144, Passcode: MechVib)		
REFERENCES	There is no specific textbook for the material presented in this course. Students are recommended to follow the references occasionally: <ul style="list-style-type: none">• L. Meirowitch, <i>Fundamentals of Vibrations</i>, McGraw Hill, 2001.• S. S. Rao, <i>Mechanical Vibrations</i>, Pearson, 2010.• D. J. Inman, <i>Engineering Vibration</i>, 4th Edition, Pearson, 2014.• S. G. Kelly, <i>Fundamentals of Mechanical Vibrations</i>, McGraw Hill, 1993.		
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 <ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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		

COURSE
REQUIREMENTS

- Pre-requisite: ENS 214 - Dynamics
- Matlab: Matlab/Simulink/Simscape will be used extensively. The course will require you to write codes and build models in Matlab and Simulink/Simscape from scratch (with no prior template given).
- There will be no recitations and limited number of problems will be solved in the class. This class assumes that you are interested in the course material, that you will spare the time and effort to practice the concepts that are taught in the class.

ONLINE CLASS
POLICIES

- Online lectures will be held via Zoom. Recordings will be shared through SUCourse+.
- You need to sign in to the Zoom lectures with your SU credentials.
- All announcements will be made through SUCourse+, students are responsible from following the announcements.
- Students cannot share or post to the Web any document or recording of any of the course material with third parties.
- Do not forget that we are all responsible for creating a safe and inclusive classroom experience for everyone in the class.

GRADING POLICY

ME 405 Grading:

Homework (30%), Midterm (30%), Final Exam (40%)

ME 505 Grading:

Homework (15%), Midterm (25%), Project (30%), Final Exam (30%)

- Midterm and Final will be proctored exams. For proctored exams, your webcam and microphone should be on during the exam. In the case of non-compliance with this and other declared exam procedures, your exam will be void. Make sure to check that your webcam and microphone function properly before the exam. Exam dates will be announced at SUCourse+.
- Throughout the semester, random oral exams will be made. You may be called upon to explain your homework/project/exam solution and answer course related questions in a one-to-one meeting with the TA/instructor. Students who fail to explain their work or answer related questions will get zero (0) credit from the related exam/homework/project
- Your attendance and participation in the lectures may affect your final grade, especially for borderline cases. Note that you must be present in the lecture for at least 40 minutes.
- 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 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, project) 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.