



AMIRKABIR

University of Technology

Dynamics

Fall 2017

COURSE DESCRIPTION:

Mechanics is a branch of the physical sciences that is concerned with the state of rest or motion of bodies subjected to the action of forces. Engineering mechanics is divided into two areas of study, namely, statics and dynamics. Statics is concerned with the equilibrium of a body that is either at rest or moves with constant velocity. Here we will consider dynamics, which deals with the accelerated motion of a body. The subject of dynamics will be presented in two parts: kinematics, which treats only the geometric aspects of the motion, and kinetics, which is the analysis of the forces causing the motion. To develop these principles, the dynamics of a particle will be discussed first, followed by topics in rigid-body dynamics in two and then three dimensions.

There are many problems in engineering whose solutions require application of the principles of dynamics. Typically the structural design of any vehicle, such as an automobile or airplane, requires consideration of the motion to which it is subjected. This is also true for many mechanical devices, such as motors, pumps, movable tools, industrial manipulators, and machinery. Furthermore, predictions of the motions of artificial satellites, projectiles, and spacecraft are based on the theory of dynamics. With further advances in technology, there will be an even greater need for knowing how to apply the principles of this subject.

COURSE STAFF:

Instructor: Dr. Siamak Epackachi

Office: Building No. 1, Seventh story, Room No....

E-mail: epackachis@aut.ac.ir

Office hours: T/TH 1:30-3:00 pm

CLASS SCHEDULE:

Lecture: Saturday 9:15-10:45 / Wednesday 10:45-12:15

REFERENCES:

Engineering Mechanics-Dynamics 7th Edition by James L. Meriam and, L. G. Kraige

Engineering Mechanics: Dynamics (14th Edition) by Russell C. Hibbeler

GRADING:

Assignments	20%
Quizzes	10%
Midterm	25%
Final	45%



- Attendance at all lectures and recitations, and active participation is expected. The instructor regularly brings up questions and discussions during lecture time. Students are encouraged to volunteer in answering questions and participate in discussions.
- *Sustained effort starting today:* Come to class and recitations regularly. Pay attention in class without distractions through smartphones etc. Bring a scientific calculator and follow along with calculations in class.
- For the assignments, although students may consult with classmates, it is expected that solutions that are submitted, reflect the individual work of students.
- Every week, problem(s) will be assigned during the recitation. You must attempt to solve the problem(s). During recitation, the instructor will show in detail how to solve the problem(s), and help you reach the correct answer. The problem(s) will be collected at the end of recitation for extra credit. You will get 5 bonus points towards your HW grade for solving problems during each recitations. Attendance is not mandatory but it is strongly recommended as it will help you succeed in the course.
- A significant part of engineering is written communication of laboratory work and analysis/design proposals. Heavy emphasis will be placed on clarity, organization and readability of your work. (a) All assignments must be submitted with no more than one problem per page. (b) Write your name, course and homework number on a cover sheet. (c) Staple pages together. (d) A clear and well-labeled **drawing** or **free body diagram** as appropriate *must* be presented with every problem. (e) Always use **units** everywhere in your work – a number without units makes no sense in engineering. (f) Show each step of the problem and clearly explain the logic being used. (g) Clearly box all final answers.

Tentative Lecture Schedule:

Chapters	Subject	Dates
Chapter 1	Introduction	Shahrivar 25
Chapter 2	Kinematics of particles	Shahrivar 29, Mehr 1, Mehr 5
Chapter 3	Kinetics of particles	Mehr 12, 15, 19
Chapter 4	Kinetics of systems of particles	Mehr 22, 26, 29
Review class		Aban 3, 6
Mid-term exam		
Chapter 5	Plane kinematics of rigid bodies	Aban 10, 13, 17, 20
Chapter 6	Plane kinetics of rigid bodies	Aban 24, 27 Azar 1, 4
Chapter 7	Three-dimensional dynamics of rigid bodies	Azar 8, 11, 18, 22
Chapter 8	Vibration and time response	Azar 25, 29 Dey 2
Review class		Dey 6, 9, 13
Final exam		