



U901-214: Dynamics

Course Format: Online

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Course credits: 3 credits

Prerequisites: Physics, Calculus (HS level)

Course Level: Intermediate

Course Description: Dynamics is a branch of Engineering Mechanics which deals with the motion of accelerated bodies. It encompasses kinematics (which deals with the geometrics of motion), and kinetics (which focuses on the forces that cause motion to occur). This course will include a study of kinematics and kinetics, as well as work, energy, impulse, and momentum in two dimensions for particles, as well as rigid bodies. Dynamics is a fundamental engineering course. The mastery of the skills presented in this course is necessary for understanding many of the problems students will face for the rest of their education, and throughout their careers.

Required Course Materials

- Hibbeler, Russell Charles. *Engineering mechanics: dynamics*. Pearson Education, 2021.

Optional/Recommended Course Materials

- None

Hardware Requirements

You will need a webcam, speakers, and a microphone. You will complete your exams through an online proctor, requiring all three components.

You will also be required to submit handwritten exam answers as a PDF. You will need access to a scanner or a smartphone to do this.

Course Learning Objectives

- Know the relationships between position, velocity, and acceleration and use these relationships to perform calculations of kinematics of a particle (and, a rigid body).
- Be able to analyze the acceleration of, and forces acting on, a particle (and rigid bodies) using the equations of motion.
- Be able to analyze particle (and, two-dimensional rigid body) kinetics using work-energy methods.
- Be able to analyze particle (and, two-dimensional rigid body) kinetics using impulse-momentum methods.

Course Overview

MODULE	MODULE TOPIC	EVALUATED ACTIVITIES
Module 1	Kinematics of a Particle	Application Discussion Quizzes Homeworks Exam #1



Module 2	Kinetics of a Particle: Force and Acceleration	Application Discussion Quizzes Homeworks Exam #2
Module 3	Kinetics of a Particle: Work and Energy	Application Discussion Quizzes Homeworks Exam #2
Module 4	Kinetics of a Particle: Impulse and Momentum	Application Discussion Quizzes Homeworks Exam #3
Module 5	Planer Kinematics of a Rigid Body	Application Discussion Quizzes Homeworks Exam #3
Module 6	Planar Kinetics of a Rigid Body: Force and Acceleration	Application Discussion Quizzes Homeworks Exam #4
Module 7	Planar Kinetics of a Rigid Body: Work and Energy	Application Discussion Quizzes Homeworks Exam #4

Evaluation Methods

Your final grade will be based on your performance on the following:

Application Discussion	03%
Quizzes	07%
Homeworks	10%
Exam #1	20%
Exam #2	20%
Exam #3	20%
Exam #4	20%
Total	100%

Application Discussion (03%)

Every module starts with an Application Discussion. In this section, students are introduced to some real-life problems. From pre-existing knowledge/idea students will be asked to share some thoughts on how the given problems can be solved. When students review the learning resources provided in the module, they will gain the

necessary knowledge to solve the problems outlined in the Application Discussion. At the end part of the module, students will return to the Application discussion and again share their thoughts on how the given problems can be solved based on the materials they have learned in the module. Application Discussions are taking 3% of the total grade.

Quizzes (07%)

Every module consists of multiple sections/topics. In each section several quizzes are given to check conceptual and problem-solving understanding. Quizzes take 7% of the total grade.

Homework (10%)

Each module consists of one or two homeworks to check the understanding of topics covered in the module. Homeworks will be taking 10% of the total grade

Exams (80%)

There will be four exams and each exam contain 20% of the total grade. Exam #1 will cover the contents covered in Module 1. Similarly, Exam #2, #3 and, #4 will cover the contents taught in modules 2-3, 4-5 and, 6-7, respectively. Your work must be submitted on **unlined copy paper** (A4 Size) as a PDF.

Exam Method: Online with Proctoring

This course requires all students to complete exams online with a proctoring service. Students receive one attempt on each exam.

Grading Scale

The following grading scale is used to evaluate all course requirements and determine your final grade:

A = 93–100	B = 83–87.9	C = 70–77.9	D = 60–69.9
AB = 88–92.9	BC = 78–82.9		F = Below 60

Pass/Fail Option

Students who enroll in an Independent Learning (IL) course under the pass/fail option will receive a final grade of S in place of a final grade equivalent to an A, AB, B, BC, or C and a final grade of U in place of a final grade equivalent to a D or F.