

**San Jose State University**  
**Department of Mechanical Engineering**  
**ME 101 – Dynamics, Section 03, Spring 2022**

**Course and Contact Information**

<b>Class Days/Time:</b>	Mondays and Wednesdays 15:00-16:15
<b>Classroom:</b>	Engineering Building 301
<b>Credit Units:</b>	3
<b>Pre-requisites:</b>	CE 95 or CE 99 and Math 32 (each with a grade of C- or better)
<b>Instructor:</b>	Dr. Amir Armani
<b>Office Hours:</b>	Mondays and Wednesdays 16:30-17:30
<b>Office Location:</b>	Engineering Building 310E
<b>Telephone:</b>	(408) 924-8354
<b>Email Address:</b>	amir.armani@sjsu.edu

**Course Description**

Vector Mechanics. Motion of particles and rigid bodies. Force, energy, and momentum principles applied to particles and rigid bodies.

**Course Format**

This class requires the use of Canvas, so you will need access to the internet. All assignments during the semester will require the use of a computer for class assignments, in-class problem solving, Mid-term and Final Exam, etc. Electronic communication with your instructor and teammates is also required.

**Instructor Material**

Materials created by the instructor for the course are copyrighted by the instructor. The university policy (S12-7) is in place to protect the privacy of students in the course, as well as to maintain academic integrity through reducing the instances of cheating. Students who record, distribute, or post these materials will be referred to the Student Conduct and Ethical Development office. Unauthorized recording may violate university and state law. It is the responsibility of students that require special accommodations or assistive technology due to a disability to notify the instructor.

**Required Text**

Vector Mechanics for Engineers - Dynamics, 12th Edition, McGraw Hill Education, by Beer, Johnston, Cornwell, and Self.

**Grading Metrics**

Homework	5% (from Connect)
Midterm	20% (Particle Dynamics)
Pre-class Quizzes	35% (Reading, Quizzes)
Pre-class Videos	1% (watch video and take a quiz)
In-class Problems	10% (Problem Solving)
Book Smart Reading	4% (on Connect)
Final Exam	25% (Comprehensive)

**Grading Scale**

95-100 A+, 90-94.9 A, 87-89.9 A-, 85-86.9 B+, 80-84.9 B, 77-79.9 B-, 75-76.9 C+, 70-74.9 C, 67-69.9 C-, 65-66.9 D+, 60-64.9 D, 57-59.9 D-, Below 57 F

## Course Goals

1. To learn fundamental concepts and principles of particle and rigid body motion kinematics
2. To learn fundamental concepts and principles of particle and rigid body kinetics
3. Application of Newton's second law to solve problems in particle and rigid body dynamics
4. In the context of B.S. Mechanical Engineering program assessment, this course is intended to help students achieve ABET Student Outcome 3a: "an ability to apply knowledge of mathematics, science, and engineering." For more information on ABET Student Outcomes, please see <http://www.abet.org/eac-criteria-2016-2017/>.

## Student Learning Objectives

Upon successful completion of this course, the student should be able to:

1. Distinguish kinematics and kinetics in dynamics of solids.
2. Develop analytical models for a given dynamic situation using particle and rigid body dynamics theories.
3. Characterize a motion to be rectilinear, curvilinear, planar rigid body dynamics.
4. Describe the motion of a particle in terms of kinematics for general curvilinear motion as well as in moving reference frames.
5. Apply Newton's Second Law in solving particle and rigid body dynamics problems.
6. Apply principle of energy and momentum principles in solving problems involving Particles; application of energy method for 2-D motion.
7. Apply vector mechanics, differential equations and integral calculus as needed in modeling and solving dynamics of engineering systems.

## University Policies

Per [University Policy S16-9](http://www.sjsu.edu/senate/docs/S16-9.pdf) (<http://www.sjsu.edu/senate/docs/S16-9.pdf>), relevant university policy concerning all courses, such as student responsibilities, academic integrity, accommodations, dropping and adding, consent for recording of class, etc. and available student services (e.g. learning assistance, counseling, and other resources) are listed on [Syllabus Information web page](http://www.sjsu.edu/gup/syllabusinfo) (<http://www.sjsu.edu/gup/syllabusinfo>), which is hosted by the Office of Undergraduate Education. Make sure to visit this page to review and be aware of these university policies and resources.

## Course Requirements and Assignment

For students majoring in Mechanical Engineering, the passing grade in this course is a C-. Any ME major receiving a grade lower than C- will be placed on probation and will be allowed another attempt to pass the course with a grade of C- or better. Failure to pass this course in two successive attempts will result in disqualification from the ME program. Non-ME majors do not have this requirement.

This class uses the proven effective method of learning a difficult subject, in which you learn the subject by an active participation in class and a pre-class preparation by reading and working on simple quizzes. To help you with the homework, pre-class quizzes, and any conceptual questions, a tutor has been appointed. You can contact him by phone or email. The contact information is given at the end of this syllabus.

## Overview of the Course Structure

This course has three main components:

### A. Pre-class Activities

To be successful in this course (and in general, any course), you must come prepared in the regularly scheduled classes; you will better understand the material being covered in the class. The pre-class activities will require you to spend **one to two hours** of reading and working on the quiz (depending on your math and physics background, it may take less or more time) and sometimes watching a short video lecture.

You will be asked to read the assigned material via McGraw Hill's Book Smart System and answer some simple quiz questions. You are not expected to learn everything on the assignment but get familiar with the basic concepts outlined in the material. The pre-class quizzes are mostly consisting of the conceptual questions from your Dynamics textbook and some additional work problems. The questions are simple and designed to quiz your basic understanding of the material, which will be covered in the class. The quizzes will be posted on Canvas; you will work them within Canvas.

You will also be assigned to watch in Canvas some technical videos and answer the associated questions. All the videos will have embedded quizzes and these quizzes will be graded. Please note that if you skip a certain part of the video, you may also miss a question embedded in there. To obtain 100% grade for watching the videos, you must obtain 100% on the embedded quizzes. You can re-watch the videos and attempt the quiz again before submission.

**Recommendation on How to Score High Grades on Pre-Class Quizzes:**

1. Complete the Book Smart Assignment
2. Review the Book Smart material in your textbook one more time and rework the example problems without looking at the solution
3. Watch the video, if assigned
4. Complete the Pre-class Quiz. Contact the tutor if you need any help with the quiz.
5. Make a list of questions to be asked when the class starts.

**B. In-class Activities**

The goal of the in-class activities is to answer any questions you might have from your pre-class assignments, discuss the complex concepts, and apply the theory by working on problems in small groups and with the help of the instructor. You will be assigned a group to work on a problem based on the concept covered that day in the class. You will submit an individual pdf copy of the solution for credit.

**C. Post-class Activities**

Additional problems will be assigned from Connect to be worked individually after the class.

NOTE 1: You must satisfy the pre-requisites listed above. Submit a softcopy of the transcript for the courses at the 2<sup>nd</sup> class meeting that satisfy the requirement. Highlight the courses that are equivalent, and the grade obtained.

NOTE 2 (**Extra Help**): You can make an appointment with the tutor for extra help. Here is the contact information:

**Raj Singh**

[raj.singh@sjsu.edu](mailto:raj.singh@sjsu.edu)

(408) 876-8406

## Tentative Course Schedule

Homework will be assigned from the McGraw Hill Connect website. Access code must be purchased to use the website. All the homework assignments will be posted on Canvas.

Lectures: Week of	Topic	Lecture #
Jan 26	Introduction – Chapter 11. 1: Kinematics of a Particle	1
Jan 31	Chapter 11. 2: Uniform Acceleration	2
	Chapter 11.2C: Pulleys	3
Feb 7	Chapter 11.3: Graphical Method	4
	Chapter 11.4: Motion of a Projectile	5
Feb 14	Chapter 11.5A: Tangential and Normal Components	6
	Chapter 11.5B: Radial and Transceivers Components	7
Feb 21	Chapter 12.1: Newton’s Second Law of Motion	8
	Chapter 12.1: Newton’s Second Law of Motion	9
Feb 28	Chapter 12.1: Newton’s Second Law of Motion	10
	Chapter 13.1: Work and Energy Methods	11
Mar 7	Chapter 13.2: Power and Efficiency, Potential Energy	12
	Chapter 13.2: Conservation of Energy Method	13
Mar 14	Chapter 13.3: Impulse and Momentum Method	14
	Chapter 13.3: Conservation of Momentum Method	15
Mar 21	Chapter 13.4: Impact - Central	16
	Chapter 13.4: Impact - Oblique	17
Apr 4	Review	
<b>Apr 6</b>	<b>Midterm Exam</b>	
Apr 11	Chapter 15.1: Kinematics of Rigid Bodies	18
	Chapter 15.2: General Plane Motion	19
Apr 18	Chapter 15.2: Relative Velocity	20
	Chapter 15.3: Instantaneous Center of Rotation	21
Apr 25	Chapter 15.4: Absolute and Relative Acceleration	22
	Chapter 15.4: Acceleration - Review	23
May 2	Chapter 16.1: Kinetics of a Rigid Body, Translation	24
	Chapter 16.1: Rigid Body Rotation	25
May 9	Chapter 16.2: Moment of Inertia	26
	Chapter 16.2: Kinetics: General Plane Motion	27
May 16	Chapter 16.2: Kinetics: General Plane Motion	28
<b>May 25</b>	<b>Final Exam: 10:30 AM – 12:15 PM</b>	

**IMPORTANT NOTE: The Final Exam is common to all the sections and is scheduled for May 25, 2022. Please note that the exam date is on the day of the Make-up Exam. You must plan your travel and other commitments accordingly. A make-up exam is allowed only for the university-approved excuses. An “I” grade will be assigned to those who do not qualify for the approved excuses and are unable to take the exam as scheduled.**