



Basic Course Information

Semester:	Spring 2025	Instructor Name:	Octavio Ortiz
Course Title & #:	ENGR 212	Email:	octavio.ortiz@imperial.edu
CRN #:	20607	Webpage (optional):	Canvas
Classroom:	212	Office #:	2767.1
Class Dates:	2/10 – 6/6	Office Hours:	See Schedule (attached)
Class Days:	T/R	Office Phone #:	760-355-5706
Class Times:	9:40 – 11:05 AM	Emergency Contact:	Silvia Murray
Units:	3	Class Format/Modality:	In-Person

Course Description

Kinetics of a particle; central force motion; systems of particles; work and energy; impulse and momentum; moments and products of inertia; Euler's equations of motion; vibration and time response; engineering applications. (CSU, UC)

Course Prerequisite(s) and/or Corequisite(s)

ENGR 210 with a grade of "C" or better, and credit or concurrent enrollment in MATH 194.

Student Learning Outcomes

Upon course completion, the successful student will have acquired new skills, knowledge, and or attitudes as demonstrated by being able to:

1. Solve problems involving kinetics of particles.
2. Solve problems involving kinematics of rigid bodies.
3. Solve problems involving plane motion of rigid bodies.
4. Demonstrate problem solving strategies by identifying an appropriate method to solve a given problem, correctly set up the problem, perform the appropriate analysis and computation, and share their interpretation of the conclusion or the outcome, using correct grammar or in an oral presentation.

Course Objectives

Upon satisfactory completion of the course, students will be able to:

1. Derive and apply the relationships between position, velocity, and acceleration of a particle in rectilinear and curvilinear motion.
2. Derive relations defining the velocity and acceleration of any particle on a rigid body for translation, rotation and general plane motion.
3. Apply the method of work and energy to engineering problems modeled as a single particle, a system of particles, or a rigid body in plane motion.
4. Apply the method of impulse and momentum to engineering problems modeled as a single particle, as system of particles, or a rigid body in plane motion.
5. Select the method of analysis that is best suited for the solution to a given problem. (Newton's Law, Work and Energy, Impulse and Momentum, or a combination of these methods).
6. Describe and analyze the plane motion of a particle relative to a rotating frame. Determine the Coriolis acceleration in plane motion.
7. Apply the principle of impulse and momentum to problems of direct and oblique central impact, as well as eccentric impact.

8. To effectively communicate legible engineering solutions to be understood by engineers both in and out of their specific disciplines.

Textbooks & Other Resources or Links

Engineering Mechanics: Dynamics (w/out Mastering Access)

Author: Hibbeler

Edition: 14th

ISBN: 978-0133915389

Copyright Year: 2016

Publisher: Pearson Prentice Hall

Course Requirements and Instructional Methods

Students will be exposed to various instructional methods. In person lectures will introduce students to fundamental engineering concepts in Dynamics. Students will then apply what they learn in lectures to problems selected from the textbook.

Homework assignments will consist of an adequate number of applied problems selected from the textbook. Solving the homework problems will help students develop the problem solving and critical thinking skills that they will need for the chapter tests and the final exam.

The chapter tests will be focused on the content covered in a particular chapter(s). Questions will consist of multiple choice, true/false and short answer to assess conceptual and theoretical understanding. In addition, a few problems will be similar to the ones on the lecture notes and the homework assignments. The final exam will be comprehensive.

Course Grading Based on Course Objectives

ASSIGNMENT	POINTS
Homework Assignments	10%
Approximately 10-12 homework assignments	
Tests	60%
Three chapter tests (20% each)	
Final Exam	30%
Comprehensive final exam 6/5/25	
Total	100%

Score	Letter Grade
≥ 90%	A
≥ 80%	B
≥ 70%	C
≥ 60%	D
< 60%	F

Academic Honesty (Artificial Intelligence -AI)

IVC values critical thinking and communication skills and considers academic integrity essential to learning. Using AI tools as a replacement for your own thinking, writing, or quantitative reasoning goes against both our mission and academic honesty policy and will be considered academic dishonesty, or plagiarism unless you have been instructed to

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do so by your instructor. In case of any uncertainty regarding the ethical use of AI tools, students are encouraged to reach out to their instructors for clarification.

Accessibility Statement

Imperial Valley College is committed to providing an accessible learning experience for all students, regardless of course modality. Every effort has been made to ensure that this course complies with all state and federal accessibility regulations, including Section 508 of the Rehabilitation Act, the Americans with Disabilities Act (ADA), and Title 5 of the California Code of Regulations. However, if you encounter any content that is not accessible, please contact your instructor or the area dean for assistance. If you have specific accommodations through **DSPS**, contact them for additional assistance.

We are here to support you and ensure that you have equal access to all course materials.

Course Policies

Attendance:

Students are expected to attend every class meeting. Lectures will preview homework assignments.

- Although attendance is not explicitly factored into your grade, failing to complete homework assignments and assessments due to absences will negatively impact your grade.
- Students with excessive absences will be dropped from the course as outlined in AP 5075.

Late Submissions:

Homework assignments are to be completed and submitted by the due date stated on Canvas. Late homework assignments will be accepted and penalized as follows:

- 70% maximum score if submitted within 24 hours of due date
- 50% maximum score if submitted 24 hours past the due date

Make-up Assignments:

There are no make-up assignments.

- Homework assignments that are more than a week past due will receive a score of 0 and cannot be made up.
- Tests and final exam cannot be made up, however, if the material is presented again in future assessments, then the failed assessment will be reevaluated.

Drop Policy

The instructor reserves the right to drop students who fail to attend the first-class session or fail to complete the first assignment by the assigned due date.

Financial Aid

Your Grades Matter! In order to continue to receive financial aid, you must meet the Satisfactory Academic Progress (SAP) requirement. Making SAP means that you are maintaining a 2.0 GPA, you have successfully completed 67% of your coursework, and you will graduate on time. If you do not maintain SAP, you may lose your financial aid. If you have questions, please contact financial aid at finaid@imperial.edu.

IVC Student Resources

IVC wants you to be successful in all aspects of your education. For help, resources, services, and an explanation of policies, visit <http://www.imperial.edu/studentresources> or click the heart icon in Canvas.

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Anticipated Class Schedule/Calendar

Week	Date	Topic	Assignment
Week 1	2/11	Syllabus Chapter 12 – Kinematics of a Particle - Rectilinear kinematics: Continuous & Erratic Motion - Motion of a Projectile	
	2/13	Chapter 12 – Kinematics of a Particle - Curvilinear Motion: Normal and Tangential Components	
Week 2	2/18	Chapter 13 – Kinetics of a Particle: Force & Acceleration - Newton's Second Law of Motion $\sum F = ma$ - Equation of Motion for a System of Particles	
	2/20	Chapter 13 – Kinetics of a Particle: Force & Acceleration - Rectangular Coordinates - Equations of Motion: Normal and Tangential Coordinates	
Week 3	2/25	Review Chapters 12-13	
	2/27	Test: Chapters 12-13	
Week 4	3/4	Chapter 14 – Kinetics of a Particle: Work and Energy - The Work of a Force - Principle of Work and Energy - Principle of Work and Energy for a System of Particles	
	3/6	Chapter 14 – Kinetics of a Particle: Work and Energy - Power and Efficiency - Conservative Forces and Potential Energy - Conservation of Energy	
Week 5	3/11	Chapter 15 – Kinetics of a Particle: Impulse and Momentum - Principle of Linear Impulse and Momentum - Principle of Linear Impulse and Momentum for a System of Particles - Conservation of Linear Momentum for a System of Particles	
	3/13	Chapter 15 – Kinetics of a Particle: Impulse and Momentum - Angular Momentum - Relation Between Moment of a Force and Angular Momentum - Principle of Angular Impulse and Momentum - Steady Flow of a Fluid Stream	
Week 6	3/18	Review Chapters 14-15	
	3/20	Test: Chapter 14-15	
Week 7	3/25	Chapter 16: Planar Kinematics of a Rigid Body - Planar Rigid-Body Motion	

Week	Date	Topic	Assignment
		○ Translation ○ Rotation about a Fixed Axis ○ Absolute Motion Analysis	
	3/27	• <u>Chapter 16: Planar Kinematics of a Rigid Body</u> ○ Relative-Motion Analysis: Velocity ○ Instantaneous Center of Zero Velocity ○ Relative-Motion Analysis: Acceleration ○ Relative-Motion Analysis using Rotating Axes	
Week 8	4/1	• <u>Chapter 17 – Planar Kinematics of a Rigid Body: Force and Acceleration</u> ○ Mass Moment of Inertia ○ Planar Kinetic Equations of Motion ○ Equations of Motion: Translation	
	4/3	• <u>Chapter 17 – Planar Kinematics of a Rigid Body: Force and Acceleration</u> ○ Equations of Motion: Rotation about a Fixed Axis ○ Equations of Motion: General Plane Motion	
Week 9	4/8	• <u>Chapter 18 – Planar Kinetics of a Rigid Body: Work and Energy</u> ○ Kinetic Energy ○ The Work of a Force ○ The Work of a Couple Moment	
	4/10	• <u>Chapter 18 – Planar Kinetics of a Rigid Body: Work and Energy</u> ○ Principle of Work and Energy ○ Conservation of Energy	
Week 10	4/15	• <u>Chapter 19 – Planar Kinetics of a Rigid Body: Impulse and Momentum</u> ○ Linear and Angular Momentum ○ Principle of Impulse and Momentum	
	4/17	• <u>Chapter 19 – Planar Kinetics of a Rigid Body: Impulse and Momentum</u> ○ Conservation of Momentum	
Spring Break			
Week 11	5/1	• Review Chapters 18 - 19	
	5/3	Test: Chapters 16-19	
Week 12	5/8	• <u>Chapter 20 – Three-Dimensional Kinematics of a Rigid Body</u> ○ Rotation about a fixed point	
	5/10	• <u>Chapter 20 – Three-Dimensional Kinematics of a Rigid Body</u> ○ General Motion	
Week 13	5/15	• <u>Chapter 20 – Three-Dimensional Kinematics of a Rigid Body</u> ○ Moments & Products of Inertia	



Week	Date	Topic	Assignment
	5/17	Chapter 21 – Three-Dimensional Kinetics of a Rigid Body - Angular Momentum	
Week 14	5/22	Chapter 21 – Three-Dimensional Kinetics of a Rigid Body - Kinetic Energy	
	5/24	Chapter 22 – Vibrations - Undamped Free Vibrations	
Week 15	5/29	Chapter 22 – Vibrations - Energy Methods	
	5/31	Chapter 22 – Vibrations - Review	
Week 16	6/3	Review Chapters 12-22	
	6/5	Comprehensive Final Exam	

Subject to change without prior notice

OCTAVIO ORTIZ
IVC Instructor's Schedule of Classes and Office Hours
Science, Math and Engineering Department
Spring 2025

		7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	
M	COURSE			Office Hour Online - Zoom 9:00 - 10:00 AM	ENGR 100 LEC/LAB 20981 10:15 - 12:45 PM RM #4300			CS 221 - Hybrid LEC/LAB 20549 1:00 - 2:25 PM RM #4300				
	CRN											
	LEC/LAB											
	FACULTY											
T	COURSE		ENGR 240		ENGR 212		Office Hour In-Person 11:15 - 12:15 PM	CS 231 LEC/LAB 20550 1:00 - 3:30 PM RM #803				
	CRN		LEC 21205		LEC 20607							
	LEC/LAB		8:00 - 9:25 AM		9:40 - 11:05 AM							
	FACULTY		RM #2721		RM #212							
W	COURSE			Office Hour In-Person 9:00 - 10:00 AM	ENGR 100 LEC/LAB 20981 10:15 - 12:45 PM RM #4300			CS 221 - Hybrid LEC/LAB 20549 1:00 - 2:25 PM RM #4300				
	CRN											
	LEC/LAB											
	FACULTY											
R	COURSE		ENGR 240		ENGR 212		Office Hour Online - Zoom 11:15 - 12:15 PM	CS 231 LEC/LAB 20550 1:00 - 3:30 PM RM #803				
	CRN		LEC 21205		LEC 20607							
	LEC/LAB		8:00 - 9:25 AM		9:40 - 11:05 AM							
	FACULTY		RM #2721		RM #212							
F	COURSE											
	CRN											
	LEC/LAB											
	FACULTY											

Course No	Sections	Lec Hrs	Lab Hrs
ENGR 100	1	2	3
ENGR 212	1	3	0
ENGR 240	1	3	0
CS 221	1	2	3
CS 231	1	2	3
Total		12	9

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