IMPERIAL VALLEY COLLEGE

Basic Course Information

Semester:	**Sprint 2022**	Instructor Name:	**Octavio Ortiz**
Course Title & #:	**ENGR 212**	Email:	**octavio.ortiz@imperial.edu**
CRN #:	**20607**	Webpage (optional):	**Canvas**
Classroom:	**2733**	Office #:	**2767.1**
Class Dates:	**2/14/22 – 6/10/22**	Office Hours:	**M: 9:45 – 10:15 AM** **T: 5:30 – 6 PM** **T/TH: 9 – 10 AM** **TH: 4:40 – 5:10 PM (IHS)**
Class Days:	**Tuesday/Thursday**	Office Phone #:	**760-355-5706**
Class Times:	**6:00 – 7:25 PM**	Emergency Contact:	**Silvia Murray: 760-355-6201**
Units:	**3**	Class Format:	**Face-to-Face**

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 effective 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 Statics. Students will then apply what they learn in lectures to problems selected from the textbook. Guidance and modeling will be provided during the face-to-face component of the course.

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 consists of multiple choice, true/false and short answer to assess conceptual and theoretical understanding. In addition, a few problems will be similar the ones on the lecture notes and the homework assignments. The final exam will be comprehensive, with more emphasis placed on chapters 4-11.

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Course Grading Based on Course Objectives

ASSIGNMENT	POINTS
Homework Assignments	**10%**
Approximately 10-12 homework assignments	
Tests	**60%**
Four chapter tests (15% each)	
Final Exam	**30%**
Comprehensive final exam **12/8/22**	
Total	**100%**

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

Course Policies

Attendance:

Students are expected to attend every class meeting. Lectures will preview programming assignments, programming applications and future assessments.

- Although attendance is not explicitly factored into your grade, failing to complete programming assignments and assessments due to absences will negatively impact your grade.

Late Submissions:

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

- 90% maximum score if submitted within 24 hours past due date
- 80% maximum score if submitted within 48 hours past due date
- 70% maximum score if submitted within 72 hours past due date
- 50% maximum score if more than three days and less than a week past due date
- No credit will be given to assignments that are one week or more past due

Programming applications/projects, quizzes and the final exam will NOT be accepted late.

Make-up Assignments:

There are no make-up assignments.

- Programming assignments that are more than a week past due will receive a score of 0 and cannot be made up.
- Programming applications/projects and quizzes cannot be made up, however, if the material is presented again in future applications or quizzes, 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.

Other Course Information

Resources:

https://www.w3schools.com – Learn Programming

https://docs.oracle.com/en/java/index.html - Java Documentation

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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Course Calendar

The semester calendar is meant to provide an overview of the topics that will be covered throughout the semester. Every effort will be made to adhere to the calendar; however, changes might be necessary.

Date or Week	Activity, Assignment, and/or Topic	Pages/ Due Dates/Tests
Week 1 February 14 – 18	Syllabus & Introduction <u>Chapter 12 – Kinematics of a Particle</u> • Rectilinear kinematics: Continuous & Erratic Motion • Motion of a Projectile • Curvilinear Motion: Normal and Tangential Components • Absolute Dependent Motion Analysis of Two Particles	**TBD**
Week 2 February 21 – 25	<u>Chapter 13 – Kinetics of a Particle: Force & Acceleration</u> • Newton's Second Law of Motion • $\sum F = ma$ • Equation of Motion for a System of Particles ○ Rectangular Coordinates • Equations of Motion: Normal and Tangential Coordinates	**TBD**
Week 3 February 28 – March 4	**Quiz 1: Chapter 12 & 13** <u>Chapter 14 – Kinetics of a Particle: Work and Energy</u> • The Work of a Force • Principle of Work and Energy • Principle of Work and Energy for a System of Particles • Power and Efficiency • Conservative Forces and Potential Energy • Conservation of Energy	**TBD**
Week 4 March 7 – 11	Review Chapters 12-14	**TBD**
Week 5 March 14 – 18	**Quiz 2: Chapter 14** <u>Chapter 15 – Kinetics of a Particle: Impulse and Momentum</u> • Principle of Linear Impulse and Momentum	**TBD**

Date or Week	Activity, Assignment, and/or Topic	Pages/ Due Dates/Tests
	• Principle of Linear Impulse and Momentum for a System of Particles • Conservation of Linear Momentum for a System of Particles • Impact	
Week 6 March 21 – 25	<u>Chapter 15 – Kinetics of a Particle: Impulse and Momentum</u> • Angular Momentum • Relation Between Moment of a Force and Angular Momentum • Principle of Angular Impulse and Momentum • Steady Flow of a Fluid Stream	**TBD**
Week 7 March 28 – April 1	Review chapters 12-15	**TBD**
Week 8 April 4 – 8	**Quiz 3: Chapter 15** <u>Chapter 16: Planar Kinematics of a Rigid Body</u> • Planar Rigid-Body Motion • Translation • Rotation about a Fixed Axis • Absolute Motion Analysis	**TBD**
Week 9 April 11 – 15	<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	**TBD**
Spring Break		
Week 10 April 25 – April 29	Review Chapters 12-16	**TBD**
Week 11 May 2 – May 6	**Quiz 4: Chapter 16** <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 • Equations of Motion: Rotation about a Fixed Axis	**TBD**

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Date or Week	Activity, Assignment, and/or Topic	Pages/ Due Dates/Tests
	• Equations of Motion: General Plane Motion	
Week 12 May 9 – 13	<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 • Principle of Work and Energy • Conservation of Energy	**TBD**
Week 13 May 16 – 20	**Quiz 5: Chapter 17 & 18** <u>Chapter 19 – Planar Kinetics of a Rigid Body: Impulse and Momentum</u> • Linear and Angular Momentum • Principle of Impulse and Momentum • Conservation of Momentum	**TBD**
Week 14 May 23 – 27	<u>Chapter 22 – Vibrations</u> • Undamped Free Vibrations • Energy Methods • Undamped Forced Vibrations	**TBD**
Week 15 May 31 – June 3	Review Chapters 19 & 22	**TBD**
Week 16 June 6 – 10	**Final: Chapters 12- 22**	

*****Subject to change without prior notice*****