IMPERIAL VALLEY COLLEGE

Basic Course Information

Semester:	**Fall 2022**	Instructor Name:	**Octavio Ortiz**
Course Title & #:	**ENGR 210**	Email:	**octavio.ortiz@imperial.edu**
CRN #:	**10603**	Webpage (optional):	**Canvas Course**
Classroom:	**3119**	Office #:	**2767.1**
Class Dates:	**8/15 – 12/10**	Office Hours:	**Faculty Schedule**
Class Days:	**T/TR**	Office Phone #:	**760-355-5706**
Class Times:	1:00 – 2:25 PM	Emergency Contact:	**Silvia Murray**
Units:	3	Class Format:	In-Person

Course Description

A first course in engineering mechanics: properties of forces, moments, couples and resultants; two-and three-dimensional force systems acting on engineering structures in equilibrium; analysis of trusses and beams; distributed forces, shear and bending moment diagrams, center of gravity, centroids, friction, and area and mass moments of inertia. Optional topics include Fluid statics, cables, Mohr's circle and virtual work. (CSU/UC)

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

PHYS 200 and MATH 194 with a grade of "C" or better, 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 statics of particles. (ILO2)
2. Understand and perform calculations using vector algebra. (ILO2)
3. Solve problems involving moments of inertia. (ILO2)
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. This outcome will be assessed through selected exercises on exams throughout the semester. (ILO1, ILO2)

Course Objectives

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

1. A significant introduction to the formulation and solution to engineering problems. To effectively communicate legible problem solutions to be understood by engineers in and out of their specific discipline.
2. Determine the forces that act on rigid bodies including external forces, weight, normal, distributed loads, friction and reactions at supports.
3. Calculate internal forces in members and create shear and bending moment diagrams for beams.
4. Perform vector analysis methods addressing forces acting on rigid bodies, trusses, frames, and machines.
5. Analyze two-and three dimensional force systems on rigid bodies and static equilibrium.

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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.

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**

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Course Policies

Attendance:

Attendance is mandatory. 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.
- Students with excessive absences will be dropped from the course as outlined in AP 5075.

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 submitted past the hard deadline (see calendar)

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

Make-up Assignments:

There are no make-up assignments.

- 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.

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

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.

Week	Date	Topic	Assignment
Week 1	8/16	• **General Principles (Ch. 1)** ○ Point-mass, Newton's Laws, Units, Right-triangle Trig	
	8/18	• **Force Vectors (Ch.2)** ○ Scalar & Vector Quantities, Vector Decomposition, Resultant Forces	
Week 2	8/23	• **Equilibrium of a Particle (Ch.3)** ○ Free body diagram, $\sum F = 0$	
	8/25	• **Equilibrium of a Particle (Ch.3)** ○ Springs ($F = ks$), cables & pulleys, 2D & 3D Force Systems	
Week 3	8/30	• **Equilibrium of a Particle (Ch.3)** ○ Review	
	9/1	○ **Test: Chapters 1-3**	
Week 4	9/6	• **Force System Resultants (Ch.4)** • Moments/Torque, moment arm, $M_0 = Fd$, Moment of a Couple, F_R for distributed loads	
	9/8	• **Force System Resultants (Ch.4)** ○ Simplifying distributed loadings	
Week 5	9/13	• **Equilibrium of a Rigid Body (Ch. 5)** ○ Free-Body diagrams (rigid body), Equilibrium of a rigid body, Equations of equilibrium	
	9/15	• **Equilibrium of a Rigid Body (Ch. 5)** ○ $\sum F = 0, \sum M_O = 0$, Support reactions (Table 5-1), Equilibrium in three dimensions	
Week 6	9/20	• **Equilibrium of a Rigid Body (Ch. 5)** ○ Review	
	9/22	○ **Test: Chapter 5**	
Week 7	9/27	• **Structural Analysis (Ch.6)** ○ Method of Sections, Zero-Force members	
	9/29	• **Structural Analysis (Ch.6)** ○ Frames & machines	
Week 8	10/4	• **Internal Forces (Ch. 7)**	
	10/6	Shear force & bending moment diagrams • **Internal Forces (Ch. 7)** Cables	
Week 9	10/11	• **Structural Analysis & Internal Forces (Ch. 6 & Ch. 7)** ○ Review	
	10/13	○ **Test: Chapters 6 & 7**	
Week 10	10/18	• **Friction (Ch. 8)**	

Week	Date	Topic	Assignment
		○ Limiting static frictional force, $F_s = \mu_s N$ (impending motion), Angle of static friction	
	10/20	• **Friction (Ch. 8)** ○ Equilibrium of systems with dry friction, Wedges	
Week 11	10/25	• **Friction (Ch. 8)** ○ Review	
	10/27	○ **Test: Chapter 8**	
Week 12	11/1	• **Center of Gravity and Centroid (Ch. 9)** ○ Center of gravity/center of mass/centroid, Centroid of an area, Centroid of a line segment	
	11/3	• **Center of Gravity and Centroid (Ch. 9)** ○ Centroid of composite figures, Theorems of Pappus & Guldinus	
Week 13	11/8	• **Center of Gravity and Centroid (Ch. 9)** ○ Review	
	11/10	• **Moments of Inertia (Ch. 10)** ○ Inertia, Definition of moment of inertia, Parallel-axis theorem, Radius of Gyration	
Week 14	11/15	• **Moments of Inertia (Ch. 10)** ○ Composite areas & moments of inertia, Mass moment of inertia	
	11/17	• **Moments of Inertia (Ch. 10)** ○ Review	
Thanksgiving Break			
Week 15	11/29	• **Virtual Work (Ch. 11)** ○ Principle of virtual work	
	12/1	• **Virtual Work (Ch. 11)** • Gravitation and elastic potential energy	
Week 16	12/6	• **Virtual Work (Ch. 11)** • Review	
	12/8	• **Comprehensive Final Exam**	

Subject to change without prior notice