IMPERIAL VALLEY COLLEGE

Basic Course Information

Semester:	**Fall 2024**	Instructor Name:	**Octavio Ortiz**
Course Title & #:	**ENGR 210**	Email:	**octavio.ortiz@imperial.edu**
CRN #:	**10603**	Webpage (optional):	**Canvas Course**
Classroom:	**2721**	Office #:	**2767.1**
Class Dates:	**8/12 – 12/7**	Office Hours:	**Faculty Schedule**
Class Days:	**T/R**	Office Phone #:	**760-355-5706**
Class Times:	**9:40 – 11:05 AM**	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. Analyze and provide a solution to a point-particle equilibrium problem. In your solution, include all listed assumptions, a free-body-diagram, and all governing equations.
2. Analyze and provide a solution to a rigid-body equilibrium problem that accounts for frictional forces and distributed loadings. In your solution, include all listed assumptions, a free-body-diagram, and all governing equations.
3. Analyze and assess the structural integrity of a truss, frame, or machine that is subjected to external forces. Address any design considerations regarding component forces.
4. Calculate the center of gravity, center of mass, centroid, and the moments of inertia of a body and describe their physical significance, if any.

Course Objectives

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

1. List and justify assumptions that simplify the complexity of, and analysis of, problems involving the equilibrium of point particles and rigid bodies
2. Draw appropriate free-body-diagrams to illustrate all forces acting on point particles and rigid bodies.
3. Reference free-body-diagrams in their formulation of a system of equations that describes the physical characteristics of a body in a state of equilibrium.
4. Analyze the state of equilibrium of point particles and rigid bodies in two and three dimensions.

5. Implement solution techniques of vector mathematics to problems involving the equilibrium of point particles and rigid bodies.
6. Assess the physical adequacy of solutions to problems involving the equilibrium of rigid bodies.
7. Analyze the internal forces within rigid bodies, machines, and trusses.
8. Draw internal shear and bending moment diagrams in simply supported beams.
9. Factor frictional forces and their effects in the analysis of problems involving the equilibrium of rigid bodies.
10. Simplify loading systems and distributed loadings on rigid bodies to a single, equivalent, resultant force and bending moment.
11. Calculate centroids and moments of inertia of basic and complex geometries.
12. Apply techniques of virtual work to solve problems involving the equilibrium of rigid bodies.
13. 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 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%**
Three chapter tests (20% each)	
Final Exam	**30%**
Comprehensive final exam **12/5/24**	
Total	**100%**

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

Course Policies

Attendance:

Attendance is mandatory. Students are expected to attend every class meeting. Lectures will preview homework assignments, and future assessments.

- 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:

- 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)

Exams and the final exam will NOT be accepted late.

Make-up Assignments:

There are no make-up assignments.

- Homework assignments and exams cannot be made up, however, if the material is presented again in future applications or exams, 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.

IMPERIAL VALLEY COLLEGE

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.

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	8/13	• **General Principles (Ch. 1)** ○ Point-mass, Newton's Laws, Units, Right-triangle Trig	
	8/15	• **Force Vectors (Ch.2)** ○ Scalar & Vector Quantities, Vector Decomposition, Resultant Forces	
Week 2	8/20	• **Equilibrium of a Particle (Ch.3)** ○ Free body diagram, $\sum F = 0$	
	8/22	• **Equilibrium of a Particle (Ch.3)** ○ Springs ($F = ks$), cables & pulleys, 2D & 3D Force Systems	
Week 3	8/27	• **Equilibrium of a Particle (Ch.3)** ○ Review	
	8/29	• **Test: Chapters 1-3**	
Week 4	9/3	• **Force System Resultants (Ch.4)** • Moments/Torque, moment arm, $M_0 = Fd$, Moment of a Couple, F_R for distributed loads	
	9/5	• **Force System Resultants (Ch.4)** ○ Simplifying distributed loadings	
Week 5	9/10	• **Equilibrium of a Rigid Body (Ch. 5)** ○ Free-Body diagrams (rigid body), Equilibrium of a rigid body, Equations of equilibrium	
	9/12	• **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	9/17	• **Equilibrium of a Rigid Body (Ch. 5)** ○ Review	
	9/19	• **Test: Chapter 4 & 5**	
Week 7	9/24	• **Structural Analysis (Ch.6)** ○ Method of Sections	
	9/26	• **Structural Analysis (Ch.6)** ○ Zero-Force members	
Week 8	10/1	• **Structural Analysis (Ch.6)** ○ Frames & machines	
	10/3	• **Internal Forces (Ch. 7)** ○ Shear force & bending moment diagrams	

Week	Date	Topic	Assignment
Week 9	10/8	• **Internal Forces (Ch. 7)** ○ Cables	
	10/10	• **Structural Analysis & Internal Forces (Ch. 6 & Ch. 7)** ○ Review	
Week 10	10/15	• **Friction (Ch. 8)** ○ Limiting static frictional force, $F_s = \mu_s N$ (impending motion), Angle of static friction	
	10/17	• **Friction (Ch. 8)** ○ Equilibrium of systems with dry friction, Wedges	
Week 11	10/22	• **Friction (Ch. 8)** ○ Review	
	10/24	• **Test: Chapter 6-8**	
Week 12	10/29	• **Center of Gravity and Centroid (Ch. 9)** ○ Center of gravity/center of mass/centroid, Centroid of an area	
	10/31	• **Center of Gravity and Centroid (Ch. 9)** ○ Centroid of a composite figure, Centroid of a line segment	
Week 13	11/5	• **Moments of Inertia (Ch. 10)** ○ Inertia, Definition of moment of inertia	
	11/7	• **Moments of Inertia (Ch. 10)** ○ Parallel-axis theorem, Radius of Gyration	
Week 14	11/12	• **Moments of Inertia (Ch. 10)** ○ Composite areas & moments of inertia, Mass moment of inertia	
	11/14	• **Moments of Inertia (Ch. 10)** ○ Review	
Week 15	11/19	• **Virtual Work (Ch. 11)** ○ Principle of virtual work	
	11/21	• **Virtual Work (Ch. 11)** • Gravitation and elastic potential energy	
THANKSGIVING BREAK			
Week 16	12/3	• **Virtual Work (Ch. 11)** • Review	
	12/5	• **Comprehensive Final Exam**	

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

IMPERIAL VALLEY COLLEGE

OCTAVIO ORTIZ

IVC Instructor's Schedule of Classes and Office Hours

Science, Math and Engineering Department

Fall 2024

		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		CS 221			ENGR 100		Office Hour			
	CRN		LEC/LAB 10521			LEC/LAB 10929		1:30 - 2:30 PM			
	LEC/LAB		7:30 - 10:00 AM			10:15 - 12:45 PM		Online			
	FACULTY		RM #801			RM #4300					
T	COURSE			Office Hour	ENGR 210		CS 281			CS 221 - Hybrid	
	CRN			8:30 - 9:30 AM	LEC 10603		LEC/LAB 10522			LEC/LAB 10962	
	LEC/LAB			In-Person	9:40 - 11:05 PM		11:30 - 2:10 PM			2:40 - 4:05 PM	
	FACULTY				RM #2721		RM #802			RM #802	
W	COURSE		CS 221			ENGR 100		Office Hour			
	CRN		LEC/LAB 10521			LEC/LAB 10929		1:30 - 2:30 PM			
	LEC/LAB		7:30 - 10:00 AM			10:15 - 12:45 PM		In-Person			
	FACULTY		RM #801			RM #4300					
R	COURSE			Office Hour	ENGR 210		CS 281			CS 221 - Hybrid	
	CRN			8:30 - 9:30 AM	LEC 10603		LEC/LAB 10522			LEC/LAB 10962	
	LEC/LAB			Online	9:40 - 11:05 PM		11:30 - 2:10 PM			2:40 - 4:05 PM	
	FACULTY				RM #2721		RM #802			RM #802	
F	COURSE										
	CRN										
	LEC/LAB										
	FACULTY										

Course No	Sections	Lec Hrs	Lab Hrs
ENGR 100	1	2	3
ENGR 210	1	3	0
CS 221	2	4	6
CS 281	1	2	3
Total		**11**	**12**

Instructor's Name	Octavio Ortiz
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