Department of Physics and Engineering

EGR 2014/L Engineering Mechanics: Statics and Lab (3 + 1 units)

Instructor: Dr. Michelle Chen
Phone: (619) 849-2960
Email: michellechen@pointloma.edu
Office Hours: MWF 12-1:30; T 1:30-2 in RS264

Class Meetings: MWF 11:00 – 11:55 AM (RS265)

Lab Meetings: RS 365
T 10:30 AM - 1:30 PM

Final Exam: Wednesday, May 6th at 10:30 AM (RS265)

PLNU Mission: To Teach ~ To Shape ~ To Send

Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service is an expression of faith. Being of Wesleyan heritage, we strive to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

Department Mission

The Physics and Engineering Department at PLNU provides strong programs of study in the fields of Physics and Engineering. Our students are well prepared for graduate studies and careers in scientific and engineering fields. We emphasize a collaborative learning environment which allows students to thrive academically, build personal confidence, and develop interpersonal skills. We provide a Christian environment for students to learn values and judgment, and pursue integration of modern scientific knowledge and Christian faith.

Course Description

Statics of particles and rigid bodies as applied to engineering design. Topics include vector algebra, forces, moments and couples, conditions of equilibrium, friction, and virtual work.

Course Learning Outcomes

After completing this course, students can:

1. Gain a fundamental understanding of Engineering Mechanics.
2. Accurately identify forces and moments on a real world system.
3. Accurately draw a free-body diagram in 2D and 3D.
4. Accurately arrive at the equations of equilibrium of a system in 2D and 3D.
5. Develop written communication skills through detailed procedures in labs.
6. Apply knowledge from course material to successfully set up experimental equipment and effectively carry out lab procedures.
7. Effectively collaborate in teams.

Required Texts and Materials

Engineering Mechanics: Statics, 14th Edition by Hibbeler

Course Credit Hour Information

In the interest of providing sufficient time to accomplish the stated course learning outcomes, this class meets the PLNU credit hour policy for a 4-unit class delivered over 15 weeks. Specific details about how the class meets the credit hour requirements can be provided upon request.

Assessment and Grading

The grade you earn in this course is based on the scale below. The points you receive during the course are weighted accordingly:

- **(20%) Lab:** Hands-on experience of topics from class meetings is the focus of the lab, along with a focus on technique and data analysis. Labs will be performed in small groups. Labs constitute 20% of your final grade. You must pass the lab portion of the class to pass the class.
- **(20%) Homework:** This work is very important in building your skills at solving physics problems.
- **(40%) Exams:** Two exams will be given during the semester. Partial credit will be given for correct reasoning at any step of a problem, but only if it is communicated clearly enough for me to understand.
- **(20%) Final exam:** A presentation that integrate what you learned in class, and includes independent research and analysis of real-life problems will take place of final exam. You will give the final presentation on the final exam time.

Grading Scale

A	B	C	D	F
S ≥ 92 (A)	**90 > S ≥ 88** (B+)	**80 > S ≥ 78** (C+)	**70 > S ≥ 68** (D+)	**S < 60**
92 > S ≥ 91 (A–)	**88 > S ≥ 82** (B)	**78 > S ≥ 72** (C)	**68 > S ≥ 62** (D)	
	82 > S ≥ 80 (B–)	**72 > S ≥ 70** (C–)	**62 > S ≥ 60** (D–)	

Late Assignments

Homework problems and lab assignments not submitted on time will receive a deduction of 20% per day.

Exams and Missing Exam Policy

Examinations and the Final Examination will include problems and questions over material assigned in the text, explored in homework, as well as material presented in class. Distributed specific learning outcomes for the section, or for the entire class will provide a good means of study. A score of zero will be assigned for an examination that is missed without prior consent or a well-documented emergency beyond your control. If such an event arises, please ensure that you communicate with the professor as soon as possible so other arrangements can be made.

Final Exam

Successful completion of this class requires taking the final examination on its scheduled day. The final examination schedule is posted on the Class Schedules site. If you find yourself scheduled for three (3) or more final examinations on the same day, you are authorized to contact each professor to arrange a different time for one of those exams. However, unless you have three (3) or more exams on the same day, no requests for alternative final examinations will be granted.

Incomplete Grade Assignment

A grade of incomplete will only be assigned in extremely unusual circumstances. If you believe that your particular circumstances qualify be in clear communication with the professor as soon as you are able.

Artificial Intelligence (AI) Policy

You are allowed to use Large Language Models (like ChatGPT, NotebookLM, Claude, etc.) as a study tool, but not on any exams. Work that utilizes AI-based tools should be identified as such including the tool used. Specific use cases will be clarified in class.

PLNU Academic Accommodations Policy

PLNU is committed to providing equal opportunity for participation in all its programs, services, and activities in accordance with the Americans with Disabilities Act (ADA). Students with disabilities may request course-related accommodations by contacting the Educational Access Center (EAC), located in the Bond Academic Center (EAC@pointloma.edu or 619-849-2533). Once a student's eligibility for an accommodation has been determined, the EAC will work with the student to create an Accommodation Plan (AP) that outlines allowed accommodations. Professors are able to view a student's approved accommodations through Accommodate.

PLNU highly recommends that students speak with their professors during the first two weeks of each semester/term about the implementation of their AP in that particular course. Accommodations are not retroactive so clarifying with the professor at the outset is one of the best ways to promote positive academic outcomes.

Students who need accommodations for a disability should contact the EAC as early as possible (i.e., ideally before the beginning of the semester) to assure appropriate accommodations can be provided. It is the student's responsibility to make the first contact with the EAC. Students cannot assume that because they had accommodations in the past, their eligibility at PLNU is automatic. All determinations at PLNU must go through the EAC process. This is to protect the privacy of students with disabilities who may not want to disclose this information and are not asking for any accommodations.

Additional Course Information

Additional PLNU policies and practices that apply to this course can be found at this https://docs.google.com/document/d/11BgAANLOJ9tjt837d24EZ181ukM2qzHF/edit

LomaBooks Instructions for Students

This course is part of our course material delivery program, LomaBooks. The bookstore will provide each student with a convenient package containing all required physical materials; all digitally delivered materials will be integrated into Canvas.

You should have received an email from the bookstore confirming the list of materials that will be provided for each of your courses and asking you to select how you would like to receive any printed components (in-store pick up or home delivery). If you have

not done so already, please confirm your fulfillment preference so the bookstore can prepare your materials.

For more information about LomaBooks, please go here.

Tentative Course Calendar

(Subject to Updates)

Date	Topic	Readi
M 01/12/26	Welcome; Vector Operations	2.1 -
W 01/14/26	Addition of Coplanar Forces; Cartesian Vectors	2.4 -
F 01/16/26	Addition of Cartesian Vectors	2.5 -
M 01/19/26	**No Class: Martin Luther King Day**	
W 01/21/26	Position Vectors; Force Vector Directed Along a Line	2.7 -
F 01/23/26	Dot Product	2.9 -
M 01/26/26	Equilibrium of a Particle; Free-Body Diagram; Coplanar Force Systems	3.1 -
W 01/28/26	3-D Force Systems	3.4 -
F 01/30/26	3-D Force Systems	3.4 -
M 02/02/26	Moment of a Force - Scalar/Vector Formulation; Cross Product	4.1 -
W 02/04/26	Moment of a Force about a Specified Axis	4.5 -
F 02/06/26	Moment of a Couple	4.6 -
M 02/09/26	Simplification of a Force and Couple System	4.7 -
W 02/11/26	Reduction of a Simple Distributed Loading	4.9 -
F 02/13/26	Chapter 4 Catch Up	
M 02/16/26	Rigid-Body Equilibrium and Free-Body Diagram	5.1 -
W 02/18/26	Equations of Equilibrium; 2-3-Force Members	5.3 -

F 02/20/26	Free-Body Diagram; Equations of Equilibrium; Constraints and Statical Determinacy	5.5 -
M 02/23/26	Chapter 5 Catch Up	
W 02/25/26	Simple Truss; Method of Joints; Zero-Force Members	6.1 -
F 02/27/26	Catch Up	
M 03/02/26	Method of Sections	6.4 -
W 03/04/26	Frames and Machines	6.6 -
F 03/06/26	Chapter 6 Catch Up	
M 03/09/26	**Spring Break**	
W 03/11/26	**Spring Break**	
F 03/13/26	**Spring Break**	
M 03/16/26	Internal Loadings Developed in Structural Members	7.1 -
W 03/18/26	Internal Loadings Developed in Structural Members	7.1 -
F 03/20/26	Dry Friction	8.1 -
M 03/23/26	Dry Friction	8.1 -
W 03/25/26	Wedges; Frictional Forces on Screws / Flat Belts	8.3 -
F 03/27/26	Wedges; Frictional Forces on Screws / Flat Belts	8.3 -
M 03/30/26	**No Class (Research Meeting)**	
W 04/01/26	**No Class (Research Meeting)**	
F 04/03/26	**No Class (Easter)**	
M 04/06/26	**No Class (Easter)**	
W 04/08/26	Center of Gravity, Center of Mass and Centroid	9.1 -
F 04/10/26	Center of Gravity, Center of Mass and Centroid	9.1 -
M 04/13/26	Composite Bodies	9.2 -

W 04/15/26	Composite Bodies	9.2 - 9
F 04/17/26	Moment of Inertia Area	10.1 - 10.1
M 04/20/26	Parallel-Axis Theorem; Radius of Gyration; Moment of Inertia for Composite Area	10.2 - 10.4
W 04/22/26	Parallel-Axis Theorem; Radius of Gyration; Moment of Inertia for Composite Area	10.2 - 10.4
F 04/24/26	Mass Moment of Inertia	10.8 - 10.8
M 04/27/26	Catch Up	
W 04/29/26	Virtual Work	11.1 - 11.3
F 05/01/26	Catch Up	
M 05/04/26		
W 05/06/26	**Final Exam: 10:30 am - 1:00 pm**	
F 05/08/26		