POINT 1902 LOMA
NAZARENE UNIVERSITY

Physics and Engineering
School of STEM

EGR 3034/3034L – Mechanics of Materials and Lab

Number of Units: 3+1

Fall 2026

Meeting days/times
(Lecture: MWF 12:15 pm – 1:10 pm)
(Lab: T 10:30am – 1:20pm)

Meeting location (Rohr Science (RS) 265)

Final Exam: (Monday, 12/14, 10:30am – 1:00 pm)

Instructor Title and Name: Dr. Anthony Cortez
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Office Location and Office Hours: RS 282 By Appointment

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

PHE: The Department of Physics & Engineering provides strong programs of study that aid in ensuring our students are well prepared for both graduate studies and careers in a variety of scientific and engineering fields. We emphasize a collaborative learning environment that allows students to thrive academically, build personal confidence, and develop interpersonal skills, while providing a Christian setting for students to learn values and judgment and pursue integration of modern scientific knowledge and Christian faith.

Course Description

EGR 3034 Mechanics of Materials (3 Units)
Theory and analysis of forces, stress, and strain within engineering structural elements and members. Topics include the theory of stress and strain, elastic and plastic deformation, modes of structural failure, compression and tension, torsion, shear, shafts, beams, posts, transformations of stress and strain.

Prerequisite(s): EGR 2014 with a grade of C- or higher and PHY 2044 with a grade of C- or higher.
Corequisite(s): EGR 3034L

EGR 3034L Mechanics of Materials Lab (1 Unit)

A lab course designed for a hands-on exploration of Mechanics of Materials.
Meets three hours per week.

Prerequisite(s): EGR 2014 with a grade of C- or higher and PHY 2044 with a grade of C- or higher.
Corequisite(s): EGR 3034

Program and Course Learning Outcomes

Through this course students develop skills so they will be able to:

1. Explain and apply engineering principles to analyze the mechanics of materials.
2. Appropriately identify and know the significant features in a stress-strain diagram for a given specimen.
3. Identify the key resultant forces of a member subjected to a given loading or shear.
4. Appropriately select materials for a particular engineering design with consideration of safety.
5. Effectively communicate reasoning behind an engineering design with a wide range of audiences (technical and non-technical).
6. Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

STUDENT OUTCOMES ADDRESSED

Students will have:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. (LO1)
2. An ability to communicate effectively with a range of audiences. (LO3)
3. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts. (LO4)
4. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives. (LO5)

Required Texts and Recommended Study Resources

Students are responsible for having the required course textbooks prior to the first day of class.

All supplemental materials posted on this course site (including articles, book excerpts, or other documents) are provided for your personal academic use. These materials may be protected by copyright law and should not be duplicated or distributed without permission of the copyright owner.

1. *Mechanics of Materials by R. C. Hibbeler– 11th Edition with Mastering Engineering*
2. *Access to Solidworks with Simulation*

Assessment and Grading

Grades will be based on the following:

- **Homework/Assignments**: Homework will be assigned weekly and is due at the start of class the following week.
- **Labs**: Labs will provide hands-on applications of the topics we are learning in lecture. Lab deliverables will include oral reports, written reports, completed worksheets, and supplemental submissions on Canvas.
- **Examinations and the Final Examination**. Examinations and the Final Examination will include problems and questions over material assigned in the text, readings and handouts, as well as material presented in class. No examination shall be missed without prior consent or a well-documented emergency beyond your control. A score of zero will be assigned for an examination that is missed without prior consent or a well-documented emergency beyond your control. The final exam date and time is set by the university at the beginning of the semester and may not be changed by the instructor. This schedule can be found on the university website and in the course calendar. No requests for early examinations will be approved. Only in the case that a student is required to take three exams during the same day of finals week, is an instructor authorized to consider changing the exam date and time for that particular student.

Grades will be based on the following:

Sample Standard Grade Scale Based on Percentages

Standard Grade Scale Based on Percentages					
	A	**B**	**C**	**D**	**F**
+		87.5- 89.5	77.5-79.5	67.5-69.5	
	91 -100	81-87.5	71-77.5	61 -67.5	0-57
_	89.5-91	79.5-81	69.5-71	57-61	

Grading Distribution	**Percent**
Exams	25
Final Exam	30
Homework	20
Labs	25
Total	100

Final Examination Policy

Successful completion of this class requires taking the final examination on its scheduled day. The final examination schedule is posted on the Traditional Undergraduate Records: Final Exam 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.

Incompletes and Late Assignments

All assignments are to be submitted/turned in by the beginning of the class session when they are due—including assignments posted in Canvas. Late assignments will receive a score of zero.

Artificial Intelligence (AI) Policy

You are allowed to use Artificial Intelligence (AI) tools (e.g., ChatGPT, Gemini Pro 1.5, GrammarlyGo, Perplexity, etc) to generate ideas, but you are not allowed to use AI tools to generate content (text, video, audio, images) that will end up in any work submitted to be graded for this course. If you have any doubts about using AI, please gain permission from the instructor.

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, by email or phone at 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 approved 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 approved accommodations in that particular course. Accommodations are not retroactive; as such, 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-related need should contact the EAC as early as possible (i.e., ideally before the beginning of the semester) to assure appropriate accommodations can be provided. In accordance with ADA, accommodations cannot constitute a fundamental alteration to course outcomes; therefore, planning ahead is vital in establishing appropriate accommodations for equal access to this course. 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 eligibility 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.

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

Additional Course Information

Additional PLNU policies and practices that apply to this course can be found at the following link: https://docs.google.com/document/d/1SoL5YMfCv_5cobhBwrDjbcZJzNKKTCfM/edit?usp=sharing&ouid=104297418648613020764&rtpof=true&sd=true

Tentative Schedule (Subject to Updates)

Week	Topic	Reading
1	Intro and Equilibrium Review	1.2
	Normal Stress	1.3-1.4
	Average Shear Stress and Design	1.5-1.6
2	Labor Day - No Class	
	Normal Strain	2.1-2.2
	Shear Strain	2.2
3	Stress-Strain Diagram	3.1-3.2
	Ductile and Brittle Materials	3.3
	Strain Energy and Poisson's Ratio	3.4-3.5
4	Shear Stress-Strain Diagram	3.6
	Creep and Fatigue *	3.7
	Catch up/Review	
5	**Exam 1**	
	Axial Load	4.1-4.2
	Statically Indeterminate Axial	4.3-4.4
6	Force Method of Analysis	4.5
	Thermal Stress and Stress Concentrations	4.6-4.7
	Torsion	5.1-5.2
7	Power Transmission and Angle of Twist	5.3-5.4
	Statically Indeterminate Torsion	5.5
	Torsional Stress Concentration	5.8
8	Catchup/Review	
	Exam 2	
	Fall Break - No Class	
9	Shear and Moment Diagrams and Graphical Method	6.1-6.2
	Bending Deformation and Flexure	6.3-6.4
	Unsymmetric Bending	6.5
10	Transverse Shear	7.1-7.2
	Shear Flow in Built-Up Members	7.3
	Thin Walled Pressure Vessels	8.1
11	State of Stress Caused by Combined Loadings	8.2
	Plane-Stress Transformation	9.1-9.2
	Principal Stresses and Mohr's Circle	9.3-9.5
12	Beam Design	11.1-11.2
	Deflection of Beams	12.1
	Catch up/Review	

13	**Exam 3**	
	Thanksgiving - No Class	
	Thanksgiving - No Class	
14	Deflection of Beams	12.2
	Method of Superposition Deflection and Statically Indeterminate Beams	12.5-12.6
	Column Buckling	13.1
15	Column Buckling Cont.	13.2
	Flex Day	
	Review	
12/14	**Final Exam @ 10:30am**	