Department of Physics and Engineering, Point Loma Nazarene University

EGR265 – Mechanics of Materials -- 3 Units

Spring 2018

Professor: Dr. Michelle Chen **E-mail:** MichelleChen@pointloma.edu
Office: Rohr Science (RS205) **Office Phone:** 619-849-2960
Office Hours: M 12:05 – 2:30 pm, T 9:00 – 10:00 am, W 1:30 – 2:30 pm, F 12:05 – 12:30 pm, or by appointment

Lecture: MWF 8:30 – 9:25 am (Rohr Science 219)
Final Exam: 7:30 – 10:00 am , Wednesday May 2, 2018 (Rohr Science 219)

Textbook: Mechanics of Materials, by Beer, F. P., Johnston, E. R., DeWolf, J. T., and Mazurek, D. F., Mc Graw Hill, 2015, 7th edition.

Course Description: 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.

Learning Outcomes: This course supports the overall learning objectives of the physics and engineering programs in building your ability to develop an understanding of the fundamental principles of physics and of engineering (LO1), and to apply physical principles, mathematical reasoning, and computational techniques to solve real-world problems (LO2)

PLNU Mission: PLNU 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 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 f modern scientific knowledge and Christian faith.

Attendance and Participation: Attendance is expected at each class session. In the event of an absence you are responsible for the material covered in class and the assignments given that day. Regular and punctual attendance at all classes is considered essential to optimum academic achievement. If the student is absent from more than 10 percent of class meetings, the faculty member can file a written report which may result in de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university drop date or, after that date, receive the appropriate grade for their work and participation. See
http://catalog.pointloma.edu/content.php?catoid=24&navoid=1581#Class Attendance
in the Undergraduate Academic Catalog.

Academic Honesty: Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting

information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See
http://catalog.pointloma.edu/content.php?catoid=24&navoid=1581#Academic Honesty
for definitions of kinds of academic dishonesty and for further policy information.

Academic Accommodations: If you have a diagnosed disability, please contact PLNU's Disability Resource Center (DRC) within the first two weeks of class to demonstrate need and to register for accommodation by phone at 619-849-2486 or by e-mail at DRC@pointloma.edu. See Disability Resource Center for additional information. For more details see the PLNU catalog. Students with learning disabilities who may need accommodations should discuss options with the instructor during the first two weeks of class. For more details see the PLNU catalog: http://catalog.pointloma.edu/content.php?catoid=24&navoid=1581#AcademicAccommodations

Class Enrollment: It is the student's responsibility to maintain his/her class schedule. Should the need arise to drop this course (personal emergencies, poor performance, etc.), the student has the responsibility to follow through (provided the drop date meets the stated calendar deadline established by the university), not the instructor. Simply ceasing to attend this course or failing to follow through to arrange for a change of registration (drop/add) may easily result in a grade of F on the official transcript.

Credit Hour: In the interest of providing sufficient time to accomplish the stated course learning outcomes, this class meets the PLNU credit hour policy for a 3 unit class delivered over 16 weeks. Specific details about how the class meets the credit hour requirements can be provided upon request.

Final Exam: 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. **Final Exam: Wednesday May 2nd 2018, 7:30 – 10:00 am.**

Copyright Protected Materials: Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.

Reading Assignment: Reading will be assigned for each lecture. You should complete the reading assignment and go over all the sample problems in the reading before coming to lectures. This will help you gain a better understanding of the material and effectively participate in group problem solving in class.

Homework: Homework will be assigned and due approximately every week. Homework is worth 20% of your final grade. You are strongly encouraged to discuss with your classmates but submit your own work. Practicing working engineering problems is critical to your success in the class, and completing this practice on time is important. Late work receives a 10% reduction in possible value per day.

Exam: There will be three in-class exams during the semester and one comprehensive final exam. Exams will be closed book, but you will be allowed to bring in a one-sided letter-sized formula sheet.

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. For problems that call for solution or explanation, no credit will be given for an answer alone; the method or reasoning must also be shown. Exams are to be taken at the time indicated in the syllabus unless other arrangements are made in advance with the professor for some unavoidable circumstance, and otherwise cannot be made up. The final examination is scheduled for 7:30 – 10:00 am on Wednesday, May 2nd. You must take ALL the exams in order to pass the class. **Final Examination Policy:** Successful completion of this class requires taking the final examination **on its scheduled day (Wednesday May 2nd, 2018, 7:30 – 10:00 am)**.

Assessment and Grading: The points you receive during the course are weighted accordingly:

Component	**Weight**
Homework	20%
Tests (3)	60% (equally weighted)
Final Exam	20%

The grade you earn in this course is based on the following scale:

A	A-	B+	B	B-	C+	C	C-	D+	D	D-
S≥ 91.0	91.0 >S≥ 89.5	89.5 >S≥ 87.5	87.5 >S≥ 81.0	81.0 >S≥ 79.5	79.5 >S≥ 77.5	77.5 >S≥ 71.0	71.0 >S≥ 69.5	69.5 >S≥ 67.5	67.5 >S≥ 61.0	61.0 >S≥ 57.0

EGR265: Mechanics of Materials (Spring 2018)

(Tentative Syllabus, Subject to Updates)

Date	Topic	Reading
T 01/09/18	Introduction	
W 01/10/18	Stress Under Axial Loading	1.1-2
F 01/12/18	Components of Stress; Factor Safety	1.3-5
M 01/15/18	**No Class (Martin Luther King Jr. Day)**	
W 01/17/18	Stree-Strain Diagrams; Deformations Under Axial Loading	2.1
F 01/19/18	Deformations Under Axial Loading; Statically Indeterminate Problems	2.1-2
M 01/22/18	Statically Indeterminate Problems; Poisson's Ratio	2.3-4
W 01/24/18	Generalized Hooke's Law; Shearing Strain	2.5-8
F 01/26/18	Stress Concentrations; Plastic Deformations; Stresses in Elastic Range	2.10-12, 3.1
M 01/29/18	Stresses in Elastic Range; Angle of Twist	3.1-2
W 01/31/18	Angle of Twist; Statically Indeterminate Shafts	3.2-3.3
F 02/02/18	Design of Transmission Shafts; Stress Concentrations	3.4-5
M 02/05/18	Stresses in Elastic Range	4.1-2
W 02/07/18	Catch Up	
F 02/09/18	**Exam #1: Chapters 1-3**	
M 02/12/18	Stresses in Elastic Range; Members Made of Several Materials	4.3-4
W 02/14/18	Stress Concentrations	4.4-5
F 02/16/18	Eccentric Axial Loading	4.7
M 02/19/18	Eccentric Axial Loading; Unsymmetric Bending	4.7-8
W 02/21/18	Unsymmetric Bending; General Eccentric Axial Loading	4.8-9
F 02/23/18	Shear and Bending-Moment Diagrams	5.1
M 02/26/18	Using Relations Between w, V, and M	5.2
W 02/28/18	Design of Prismatic Beams in Bending	5.3
F 03/02/18	Design of Prismatic Beams in Bending; Shearing Stresses in Beams	5.3, 6.1
M 03/05/18	***No Class (Spring Break)***	
W 03/07/18	***No Class (Spring Break)***	
F 03/09/18	***No Class (Spring Break)***	
M 03/12/18	Shearing Stresses in Beams	6.1
W 03/14/18	Shearing Stresses in Thin-Walled Members	6.3
F 03/16/18	Shearing Stresses in Thin-Walled Members; Transformation of Plane Stress	6.4, 7.1

M 03/19/18	Catch Up	
W 03/21/18	**Exam #2: Chapters 4-6**	
F 03/23/18	Transformation of Plane Stress	7.1
M 03/26/18	Mohr's Circle for Plane Stress	7.2
W 03/28/18	Mohr's Circle for Plane Stress; Three-Dimensional Analysis of Stress	7.2-4
F 03/30/18	***No Class (Easter)***	
M 04/02/18	***No Class (Easter)***	
W 04/04/18	Thin-Walled Pressure Vessels; Equation of Elastic Curve	7.6, 9.1-1A
F 04/06/18	Statically Indeterminate Beams; Method of Superposition	9.2, 9.4
M 04/09/18	Method of Superposition; Euler's Column Formula	9.4, 10.1
W 04/11/18	Euler's Column Formula	10.1
F 04/13/18	Design of Columns under a Centric Load	10.3
M 04/16/18	Design of Columns under Centric/Eccentric Load	10.3-4
W 04/18/18	Design of Columns under an Eccentric Load	10.4
F 04/20/18	Strain Energy	11.1-2
M 04/23/18	Fission	11.4-5
W 04/25/18	Fusion; Radiation and the Body	Catch Up
F 04/27/18	**Exam #3: Chapters 7, 9-11**	Exam #3
M 04/30/18		
W 05/02/18	**Final Exam (7:30 - 10:00 am)**	
F 05/04/18		