EGR 265: Mechanics of Materials **Course Syllabus, Fall 2015**

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Office hours:	MWF 1:00 – 2:30 and by appointment and by appointment
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Class Meeting Time:	(RLC 106) 9:30-10:45 T-R

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 becomes an expression of faith. Being of Wesleyan heritage, we aspire to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

Materials – Mechanics of Materials, 7e. Beer, F. P., Johnston, E. R., DeWolf, J. T., and Mazurek, D. F., Mc Graw Hill, 2011, 6th edition.

Prerequisites or Co-requisites - PHY 241 University Physics. An analytic, calculus-based study of mechanics, waves, and thermodynamics.

Canvas:
The online resource Canvas is integral for this course, and you are expected to login regularly. You need a reliable internet connection to be able to use this resource.

Course Description
EGR 265 – Mechanics of Materials is a first engineering course in the understanding of solid body mechanics. It is essential for the prediction of structural failure in any industry application. This course is the pre-requisite to Machine Design and any further study in deformable mechanics. The course covers the 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.

Course Learning Outcomes - The objectives of the course are to:

1. Understand the concepts of stress and strain, normal stress and strain, shear stress and strain, general state of stress, and design of simple connections.

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2. Understand stress analysis, materials' behavior, constitutive relationship, Hookes law, stress concentration, St Venant principle, transformation equations, and Mohrs circle.
3. Learn about axially loaded members, torsion, change of length, angle of twist, transmission of power by shafts, and statically indeterminate structures.
4. Understand bending, shear and moment diagrams, shear force, transverse loading relationship, and flexure formulas.
5. Learn the concepts of deflection of beams, differential equation of deflection curve, method of superposition, and Castiglianos theorem.

Class Meetings – Studying mechanics of materials requires active learning and participation during class. In preparation for each class meeting there is a reading assignment. To maximize your learning and participation during our meetings it is very important that you have read this material before class.

Class Conduct – Attendance and punctuality are requirements for the course to help the student maximize his overall learning experience. Class exercises, questions and other elements of participation are factors in the students' overall grade assessment. The student is accountable for *all material* covered in class. In addition, students need to respect the classroom environment, and activity such as cell phone use, talking during the class lecture portions (when not engaged in questions and answers) and/or any other related behavior that interferes with the learning experience will be addressed to the student by the instructor.

Course Objectives – An emphasis is placed on both conceptual understanding and the ability to solve problems dealing with the concepts studied

(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design a system, component, or process to meet desired needs
(c) an ability to identify, formulate, and solve engineering problems
(d) a recognition of the need for, and an ability to engage in life-long learning
(e) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
(f) an ability to apply principles of engineering, basic science, and math to model, analyze, design and realize physical systems, components or processes

Homework – Homework is worth 10% of your final grade.

Submission: Written homework solutions should be worked neatly in clear logical steps. (Solutions and explanations should be clear enough that one of your peers could easily follow what you did if they had not worked the problem before.)

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Collaboration: We expect and encourage collaboration between you and your peers while working on your homework, but your work should be your own original solutions. Allow adequate time to work and think about problems by yourself first before you work together with your peers or ask questions of me. When you sit down to write up a problem, you should not use notes copied from someone else. The guideline is that you should have no trouble explaining or repeating work that you turn in.

Late Submission: Up to one late assignment per quad will be accepted late with a 10% reduction in grade for every day it is late. This begins with a 10% reduction for an assignment turned in later in the day after this homework has been collected at the beginning of class.

Exams – Examinations will be given in class, which count toward 40% of your final grade, consisting of three midterms. The final exam is comprehensive and counts for 25% of your grade. Exams will be closed book. Partial credit will be given for correct reasoning at any step of the problem, but only if it is communicated clearly enough for me to understand. For problems that call for a solution or explanation, no credit will be given for an answer alone; the method or reasoning must also be shown.

Final Grades – The grade you earn in this course is roughly based on the following scale: 100%-88% A, 88%-85.5% A-, 85.5%-83% B+, 83%-78% B, 78%-75.5% B-, 75.5%-73% C+, 73%-68% C, 68%-65.5% C-, 65.5%-63% D+, 63%-58% D, 58%-55.5% D-. The points you receive during the course are weighted accordingly: in-class quizzes: 15%, homework: 10%, exams (3): 50%, final exam: 25%.

Academic Integrity – Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. As stated in the university catalog, "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. Such acts include plagiarism, copying of class assignments, and copying or other fraudulent behavior on examinations." All students are expected to uphold the highest standards of honesty and integrity in their academic work. Cheating or plagiarism may result at a minimum in failure on the assignment and may result in an automatic failure in this course.

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Academic Accommodations –While all students are expected to meet the minimum academic standards for completion of this course, students with disabilities may require academic accommodations. To request academic accommodations, you will need to file documentation with the Disability Resource Center (DRC), located in the Bond Academic Center. Once documentation is filed, the DRC will contact your instructors and provide written recommendations for reasonable and appropriate accommodation to meet your needs. If you have questions or would like to discuss those or any learning problems, please feel free to contact me. See Academic Policies for full text.
In compliance with federal law, neither PLNU student ID nor social security number should be used in publicly posted grades or returned sets of assignments without student written permission. This class will meet the federal requirements by (Note: each faculty member should choose one strategy to use: distributing all grades and papers individually; requesting and filing written student permission; or assigning each student a unique class ID number not identifiable on the alphabetic roster.). Also in compliance with FERPA, you will be the only person given information about your progress in this class unless you have designated others to receive it in the "Information Release" section of the student portal. See Policy Statements in the (undergrad/ graduate as appropriate) academic catalog.

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 Class Schedules site. No requests for early examinations or alternative days will be approved.

The Final Exam will be held on Tuesday, December 15, 2015 from 10:30 – 1:00 pm.

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FERPA Policy: In compliance with federal law, neither PLNU student ID nor social security number should be used in publicly posted grades or returned sets of assignments without student written permission. This class will meet the federal requirements by (Note: each faculty member should choose one strategy to use: distributing all grades and papers individually; requesting and filing written student permission; or assigning each student a unique class ID number not identifiable on the alphabetic roster.). Also in compliance with FERPA, you will be the only person given information about your progress in this class unless you have designated others to receive it in the "Information Release" section of the student portal. See Policy Statements in the (undergrad/ graduate as appropriate) academic catalog.

EGR 265 – 1 Mechanics of Materials

Professor Christopher Gabler
Rohr Science 209, 619-849-2356, cgabler@pointloma.edu
Office Hours: MWF 1:00 –2:30 and by appointment

LECTURE SCHEDULE *(tentative)*

T 09/01	**No scheduled class**	
R 09/03	**Course Overview, Statics FBD, Stress**	**1-10, 30-32, and 54-66**

M 09/07	**Labor Day – No Classes**	
T 09/08	**Example problems, Shearing Stress**	**10-18, 26-30**
R 09/10	**Shearing strain, statically indeterminate problems**	**78-81 and 98-103**
T 09/15	**Temperature change factors, Poisson's ratio, and strain energy**	**82-87, 93-95, and 694-700**
R 09/17	**Homework Problems – Solutions, Review**	
T 09/22	**Saint-Venant's principle, stress concentration, plastic deformation**	**65-67, 115 - 120**
R 09/24	**Torsion of Shafts**	**142-162**
T 09/29	**Homework Problems – Solutions, Review**	
R 10/01	**Statically indeterminate shafts, design of transmission shafts, and strain energy for shearing stress**	**170-190, 701-702**
T 10/06	**Homework Solutions – Review for Exam 1**	**_**
R 10/08	**EXAM #1**	**_**
T 10/13	**Solution of midterm exam, pure bending**	**236-236**
R 10/15	**Unsymmetrical bending, general case of axial loading, and beams made of several materials**	**303-312**
T 10/20	**HW solution and shear and bending moment diagrams**	**348-354**
R 10/22	**Equilibrium equations, design of beams for bending**	**346 - 354**
T 10/27	**Bending energy, and impact loads**	**784-795**

T 11/03	**Sample Problems, Homework Solutions – EXAM #2 Review**	**_**
R 11/05	**EXAM #2**	**_**
T 11/10	**EXAM #2 Solutions - Transformations of stress and strain**	**476-555**
R 11/12	**General state of stress and stress in thin-walled pressure vessels (HW assignment)**	**520-524, 549**
T 11/17	**Failure criteria and principal stresses**	**483, 507-513, 548-549**

R 11/19	**Homework Assignment Solutions**	**_**
T 11/24	**Deflection of beams (HW assignment)**	**589-689, 790-795, 806-809**
R 11/26	***Thanksgiving Holiday – No Classes***	**_**
T 12/01	**Homework Solutions – EXAM #3 Review**	**_**
R 12/03	**EXAM #3**	**_**
T 12/08	**EXAM #2 Solutions - Statically indeterminate systems**	**600-601, 611-617**
R 12/10	**Homework solution and Castigliano's theorem**	**804-809, 826**
T 12/15	**FINAL EXAM**	**_**

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