Department of Physics and Engineering, Point Loma Nazarene University

EGR 2014 – Engineering Mechanics: Statics -- 4 Units (3 units lecture + 1 unit lab)

Spring 2020

Professor: Dr. Michelle Chen **E-mail:** MichelleChen@pointloma.edu
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Office Hours: T 11:00 – 11:45 am; 1:30 – 2:30 pm; W 1:30 – 2:30 pm;
R 2:30 – 3:30 pm; F 1:15 – 1:45 pm; and by appointment

Lecture: MWF 7:25 – 8:20 am, (RS 265)
Lab: Section 1: M 12:15 – 2:00 pm; (RS 265)
Final Exam: 1:30 – 4:00 pm, Thursday May 7, 2020

Textbook: *Vector Mechanics for Engineers (Statics)* 11th edition, by Beer, Johnston, Mazurek.

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.

Student Learning Outcomes: This course supports the overall learning objectives of the physics and engineering programs in building your ability: (1) to develop an understanding of the fundamental principles of physics and of engineering (LO1), (2) to apply physical principles, mathematical reasoning, and computational techniques to solve real-world problems (LO2), (3) to design and conduct experiments or complete an engineering design project as well as analyze and interpret data (LO3), and (4) to effectively collaborate in teams (LO6).

Homework: Homework will be assigned either in class or posted on CANVAS. You are strongly encouraged to discuss with your classmates but to submit your own work. Late assignment will receive 20% deduction of the full grade for each day of being late.

Lab: Weekly lab meetings will provide you the opportunity for hands-on experience of topics from class meetings, improve lab technique, and data analysis. Labs will be performed in small groups, but each individual is responsible for submitting their own results. Lab grade is 20% of overall course grade, therefore the lecture and the lab will have the same grade on your transcript. You must pass the lab portion of the class to pass the class. Lab reports will be turned in at the end of each lab. No late labs will be accepted.

Tests: There will be three in-class tests during the semester. The tests will be closed book. 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. No make-up exams are allowed except for warranted circumstances. You must take ALL tests in order to pass the class.

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, 1:30 – 4:00 pm on Thursday May 7, 2020.

Final Grade: The points you receive during the course are weighted accordingly:

Component	Weight
Homework	15 %
Labs	20 %
Tests	45 %
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

University Mission: 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.

Attendance: 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 Attendance Policy in the in the Undergraduate Academic Catalog.

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.

Academic Accommodations: While all students are expected to meet the minimum standards for completion of this course as established by the instructor, students with disabilities may require academic adjustments, modifications or auxiliary aids/services. At Point Loma Nazarene University (PLNU), these students are requested to register with the Disability Resource Center (DRC), located in the Bond Academic Center. (DRC@pointloma.edu or 619-849-2486). The DRC's policies and procedures for assisting such students in the development of an appropriate academic adjustment plan

(AP) allows PLNU to comply with Section 504 of the Rehabilitation Act and the Americans with Disabilities Act. Section 504 (a) prohibits discrimination against students with special needs and guarantees all qualified students equal access to and benefits of PLNU programs and activities. After the student files the required documentation, the DRC, in conjunction with the student, will develop an AP to meet that student's specific learning needs. The DRC will thereafter email the student's AP to all faculty who teach courses in which the student is enrolled each semester. The AP must be implemented in all such courses.

If students do not wish to avail themselves of some or all of the elements of their AP in a particular course, it is the responsibility of those students to notify their professor in that course. PLNU highly recommends that DRC students speak with their professors during the first two weeks of each semester about the applicability of their AP in that particular course and/or if they do not desire to take advantage of some or all of the elements of their AP in that course.

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 the catalog for definitions of kinds of academic dishonesty and for further policy information.

Final Exam: Date and Time: 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 for this course is at 1:30 – 4:00 pm on Thursday May 7th, 2020.

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.

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 4 unit class delivered over 15 weeks. 3 units are for lectures and 1 unit is for labs. Specific details about how the class meets the credit hour requirements can be provided upon request.

EGR2014: Engineering Mechanics: Statics (Spring 2020)

(Tentative Syllabus, Subject to Updates)

Date	Topic	Reading	Lab (M/T/R)
W 01/15/20	Introduction		
R 01/16/20	Addition of Planar Forces	2.1	
F 01/17/20	Adding Forces by Components	2.2	
M 01/20/20	**No Class (Martin Luther King Jr. Day)**		
W 01/22/20	Forces and Equilibrium in a Plane	2.3	Lab 1: Forces
F 01/24/20	Adding Forces in Space	2.4	
M 01/27/20	Forces and Equilibrium in Space	2.5	
W 01/29/20	Forces and Moments	3.1	
F 01/31/20	Moment of a Force about an Axis	3.2	
M 02/03/20	Couples and Force-Couple Systems	3.3	
W 02/05/20	Couples and Force-Couple Systems	3.3	
F 02/07/20	Simplifying Systems of Forces	3.4	
M 02/10/20	Simplifying Systems of Forces	3.4	
W 02/12/20	Catch Up		Lab 2: Equilibrium Condition 1
F 02/14/20	Equilibrium in Two Dimensions	4.1	
M 02/17/20	**Exam #1**		
W 02/19/20	Two Special Cases	4.2	Lab 3: Equilibrium Codition 2
F 02/21/20	Equilibrium in Three Dimensions	4.3	
M 02/24/20	Equilibrium in Three Dimensions	4.3	
W 02/26/20	Planar Centers of Gravity and Centroids	5.1	Lab 4: Equilibrium in 3D
F 02/28/20	Further Considerations of Centroids	5.2	
M 03/02/20	Additional Applications of Centroids	5.3	
W 03/04/20	Additional Applications of Centroids	5.3	Lab 5: Centroid?
F 03/06/20	Centers of Gravity and Centroids of Volumes	5.4	
M 03/09/20	***No Class (Spring Break)***		
W 03/11/20	***No Class (Spring Break)***		
F 03/13/20	***No Class (Spring Break)***		
M 03/16/20	Centers of Gravity and Centroids of Volumes	5.4	
W 03/18/20	Catch Up		Lab 5: Centroid
F 03/20/20	Analysis of Trusses	6.1	
M 03/23/20	**Exam #2**		
W 03/25/20	Other Truss Analysis	6.2	
F 03/27/20	Other Truss Analysis	6.2	
M 03/30/20	Frames	6.3	
W 04/01/20	Frames	6.3	Lab 6: Truss
F 04/03/20	Machines	6.4	
M 04/06/20	The Laws of Dry Friction	8.1	
W 04/08/20	Wedges and Screws	8.2	
F 04/10/20	***No Class (Easter)***		
M 04/13/20	***No Class (Easter)***		
W 04/15/20	Belt Friction	8.4	Lab 7: Friction
F 04/17/20	Moments of Inertia of Areas	9.1	
M 04/20/20	Parallel-Axis Theorem and Composite Areas	9.2	
W 04/22/20	Mass Moments of Inertia	9.5	Lab 8: Moment of Inertia
F 04/24/20	Virtual Work	10.1	
M 04/27/20	Work, Potential Energy, and Stability	10.2	
W 04/29/20	Catch Up		
F 05/01/20	**Exam #3**		
M 05/04/20			
W 05/06/20			
F 05/08/20	**Final Exam (7:30 - 10:00 am)**		