ME 219 Strength of Materials II  
*(Section 01, Class Number 74867)*  
California State Polytechnic University, Pomona  

*Fall 2015 - Syllabus*

**Instructor:** Dr. Parham Piroozan  
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Engineering Laboratories 17 2631  
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Office hours: M 8:00 AM-9:00 AM and 5:00 PM-6:00 PM, W 8:00 AM-9:00 AM and 1:00 PM-2:00 PM

**Prerequisites:** C- or better in ME 218 Strength of Materials I and ME 224L Mechanics Laboratory

**Status:** This course is required for all Mechanical Engineering students

**Lectures:** Monday, Wednesday, Friday 10:00-10:50 AM, College of Eng’g 9 335

**Laboratories:** None


**Course Objectives:**  
This course is a continuation of Strength of Materials I (ME 218) which is intended to give students an understanding of both the theory and application of the fundamental principles of mechanics of materials. Various topics will be discussed including: deflection and slope of beams by double integration, singularity functions, superposition, and energy methods; statically indeterminate beams, column analysis with centric and eccentric loads; combined axial, torsional, and flexural stresses.

**Specific ABET Objectives:**

a) An ability to apply knowledge of mathematics, science and engineering.

b) An ability to design and conduct experiments, as well as to analyze and interpret data.

c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic,
environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
d) An ability to function on multi-disciplinary teams.
e) An ability to identify, formulate, and solve engineering problems.
f) An understanding of professional and ethical responsibility.
g) An ability to communicate effectively.
h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
i) A recognition of the need for, and an ability to engage in life-long learning.
j) A knowledge of contemporary issues.
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Class Requirements:
Attendance is expected. Students should bring their book, calculator, notebook, and pen or pencil to each class. No late work will be accepted unless approved by Dr. Piroozan. Your cell phones must be on mute (preferably off) and not answered until the end of class.

Tests: One midterm exam will be held on the following day:
Friday, November 6
Final Exam: Wednesday, December 9, 9:10 - 11:10 AM
All exams are closed book. There would be no make-up exams.

Grading: Quizzes: 30%
Midterm Exam: 30%
Final Exam: 40%

Approximate grading scale is as follows (modified percentage):
90 - 100 % A
80 - 89 % B
70 - 79 % C
60 - 69 % D
Below 60 % F

Topics: The course will cover the following topics:

Combined Loadings: Thin-Walled Pressure Vessels, State of Stress Caused by Combined Loadings
**Stress Transformation:** Plane-Stress Transformation, General Equations of Plane-Stress Transformation, Principal Stresses and Maximum In-Plane Shear Stress, Mohr’s Circle-Plane Stress, Absolute Maximum Shear Stress

**Strain Transformation:** Plane Strain, General Equations of Plane-Strain Transformation, Mohr’s Circle-Plane Strain, Absolute Maximum Shear Strain, Strain Rosettes, Material-Property Relationships

**Design of Beams and Shafts:** Basis for Beam Design, Prismatic Beam Design, Shaft Design

**Deflection of Beams and Shafts:** The Elastic Curve, Slope and Displacement by Integration, Discontinuity Functions, Method of Superposition, Statically Indeterminate Beams and Shafts, Statically Indeterminate Beams and Shafts-Method of Integration, Statically Indeterminate Beams and Shafts-Method of Superposition

**Buckling of Columns:** Critical Load, Ideal Column with Pin Supports, Columns Having Various Types of Supports, The Secant Formula, Design of Columns for Concentric Loading, Design of Columns for Eccentric Loading

**Energy Methods:** External Work and Strain Energy, Elastic Strain Energy for Various Types of Loading, Conservation of Energy, Castiglano’s Theorem, Castiglano’s Theorem Applied to Trusses, Castiglano’s Theorem Applied to Beams

**Student Dishonesty:**
Collaboration on homework (not copying) is recommended. Student dishonesty (cheating or plagiarizing) will not be tolerated in any class at Cal Poly, Pomona. Students are encouraged to inform the academic advisors of instances of cheating or plagiarizing. Students are guilty of plagiarism when they present someone else’s work as their own such as copying homework, copying lab reports, copying computer programs, etc. **Penalties** for student dishonesty can include a grade of “F” in the course. (Refer to Cal Poly Pomona University Catalog 2015-2016, Student Conduct and Discipline)

**Policy Concerning Students with Disabilities:**
Cal Poly Pomona, as a learning-centered university, is committed to student success. If you have a documented disability requiring academic adjustments or accommodations, please notify me privately or the Disability Resource Center (909 869-3333, building 9 room 103) during the first week of class. Early notification will ensure that your learning experience is not compromised or delayed.
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<thead>
<tr>
<th>Week</th>
<th>Reading</th>
<th>Topic</th>
<th>Assignment</th>
<th>Notes</th>
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<tr>
<td>(1) Sep 24-25</td>
<td>Review Ch 1 - 7 Ch 6: 6.1 and 6.2</td>
<td>Shear and Moment Diagrams</td>
<td>Review stress, strain, axial load, torsion, bending, and transverse shear Assignment 1: Ch 6: 6.2, 6.5, 6.9, 6.16, 6.19, 6.27, 6.29, 6.34, 6.39, 6.40, 6.43, and 6.44</td>
<td>Quiz 1 (Friday Oct 9)</td>
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<td>(2) Sep 28-Oct 2</td>
<td>Ch 8: 8.1 and 8.2</td>
<td>State of Stress in Thin-Walled Pressure Vessels, Combined Loadings Assignment 2: Ch 8: 8.2, 8.3, 8.4, 8.5, 8.7, 8.8, 8.21, 8.28, 8.35, 8.42, 8.53, 8.54, 8.63, 8.64, 8.70, and 8.71</td>
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<td>(4) Oct 12-16</td>
<td>Ch 10: 10.1 thru 10.5</td>
<td>Strain Transformation, Plane Strain, Strain Measurement, Strain Rosettes Assignment 4: Ch 10: 10.2, 10.3, 10.6, 10.8, 10.9, 10.13, 10.15, 10.17, 10.18, 10.19, 10.20, 10.21, 10.23, 10.25, 10.26, 10.28, and 10.29</td>
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<td>(6) Oct 26-30</td>
<td>Ch 12: 12.1 thru 12.3</td>
<td>Deflection of Beams, Beam Deflection by Singularity Functions Assignment 6: Ch 12: 12.3, 12.6, 12.11, 12.12, 12.20, 12.22, 12.23, 12.24, 12.26, 12.27, 12.31, 12.34, 12.36, 12.39, 12.44, 12.47, 12.48, 12.49, and 12.50</td>
<td>Last week of classes (Classes end Friday, Dec 4)</td>
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<td>(12) Dec 7-11</td>
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