

UNIVERSITY OF CALIFORNIA, SAN DIEGO
Solid Mechanics I - AMES 130A

Class: Tuesdays, Thursdays 2:30 - 4:20 p.m. GH 1118
Office Hours: Tuesdays, Thursdays 4:30-5:30 p.m.
Start: March 30, 1993
End: June 3, 1993
Number of classes: 36
Instructor: Dr. M. A. Meyers (EBU1 3209)
Final Exam: June 7, 1993 8:00 - 11:00 a.m.

I. Course Objectives

Mechanics of Materials is an essential course in most engineering curricula. The design of machines, components, structures and foundations requires the use of the methodologies of mechanics combined with the enlightened empiricism of the engineer. The students are already knowledgeable in the basic concepts of mechanics from the courses "Statics" (121A) and "Dynamics" (121B). In the present course, these concepts will be reviewed, expanded upon, and applied to a variety of loading situations. Most of the course deals with linear elastic behavior, and our ultimate objective is to design mechanical and structural systems that do not fail. These are examples of engineering applications of the principles that will be established in the course:

Mechanical Engineering:	gears shafts metallic structures
Civil Engineering:	buildings bridges foundations
Mining Engineering:	tunnels underground excavations
Chemical Engineering:	pressure vessels autoclaves
Petroleum Engineering:	wells offshore rigs
Aeronautical Engineering:	aircraft
Materials Engineering:	rolling mills wire-drawing benches micromechanics (microstructural effects)

Thus, the basic equations of mechanics are used for a number of practical applications, and the student will gradually develop the ability to design components. We will purposely use both the International System of Units (SI) and the U. S. Customary System (USCS) throughout this course, and the student will learn how to adjust to these switches. We feel that this will prepare him to face a professional environment where both systems are used side-by-side.

III. Grading and Exams

Grading will be based on two progress exams, a final exam, and homework which will be assigned weekly. It will be due on Thursdays, in the beginning of the class. The graders will return homework after one week. **NO LATE HOMEWORK WILL BE ACCEPTED.** The relative weight of exams and homework are:

First progress exam	20%
Second progress exam	20%
Final exam	40%
Homework	<u>20%</u>
	100%

Grading will be done on an absolute scale. The grades will be assigned according to the following scale:

A	85 - 100
B	70 - 85
C	55 - 70
D	40 - 55
F	Less than 40

IV. Readers

Urey Hall 7205:

Monday – 6:00 - 8:00 Tina Casso/Carey Gilchrist

Wednesday – 6:00 - 8:00 Andrew Davol

Arlene Showers will be the additional reader.

Rick Tavares will be a Visiting Teaching Assistant.

Solution sets for homework and midterm will be available at soft reserves.

V. Additional Recommended Books

- 1) J. M. Gere and S. P. Timoshenko, *Mechanics of Materials*, PWS - Kent Publishing, 1990.
- 2) S. P. Timoshenko and J. N. Goodier, *Theory of Elasticity*, McGraw-Hill, 1970.

II. Course Structure and Homework Assignments

Textbook: E. P. Popov, *Engineering Mechanics of Solids*, Prentice Hall. 1990.

- Week 1 March 30, April 1
Chapter 1: Stress - Axial Loads - Safety Concepts
Homework: 1-20, 1-23, 1-29, 1-37
- Week 2 April 6, 8
Chapter 2: Axial Strains and Deformations in Bars
Homework: 2-10, 2-15, 2-70, 2-73
- Week 3 April 13, 15
Chapter 3: Generalized Hooke's Law
 Pressure Vessels
Homework: 3-3, 3-10, 3-11, 3-15
- Week 4 April 20, 22 (Midterm: April 20)
Chapter 4: Torsion
Homework: 4-1, 4-14, 4-22, 4-34
- Week 5 April 27, 29
Chapter 5: Axial Force, Shear, and Bending Moment
Homework: 5-6, 5-46, 5-61, 5-68
- Week 6 May 4, 6
Chapter 6: Pure Bending and Bending with Axial Forces
Homework: 6-3, 6-4, 6-21, 6-34
- Week 7 May 11, 13 (Midterm: May 13)
Chapter 7: Shear Stresses in Beams and Related Problems
Homework: 7-17, 7-26, 7-35, 7-49
- Week 8 May 18, 20
Chapter 9: Elastic Stress Analysis and Design
Homework: 9-16, 9-21, 9-25, 9-44
- Week 9 May 25, 27
Chapter 10: Deflection of Beams
 Part A, Deflections by Integration
Homework: 10-2, 10-3, 10-5, 10-6, 10-9
- Week 10 June 1, 3
 Part B, Deflection by the Moment-Area Method