CEE 150 MECHANICS OF MATERIALS
(Required for CE and EnE)

Catalog Data: **CEE 150: Mechanics of Materials (Credit Units: 4) F.** Stresses and strains, strain-stress diagrams, axial deformations, torsion, bending and shear stresses in beams, shear force and bending moment diagrams, combined stresses, principal stresses, Mohr's circle, deflection of beams, columns. Prerequisite: CEE 30 or ENGR 30 or MAE 30. Same as ENGR 150. CEE150/ENGR150 and CEEH150/ENGRH150 may not both be taken for credit. (Design units: 1)

Textbook: Beer, F.P. Johnson, E.R. and J.T. DeWolf, *Mechanics of Materials,* 4th Edition, McGraw-Hill, 2001.

References: Hibbler, R.C., *Mechanics of Materials,* 6th Edition, Pearson/Prentice Hall, 2005.

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Course Objectives: Develop and apply various analytical methods for determining the mechanical behavior of solid bodies (for example: stress, strain, strength, stiffness, deflection, and stability) subjected to various types of loading which include: axial loading, bending, shear, torsion, or a combination. A thorough understanding of the mechanical behavior of materials is essential for the safe design of all structures: building, bridges, machines, submarines, ships, airplanes, and pressure vessels.

Course Outcomes: Students will:
Apply knowledge of mathematics, science, and engineering dealing with mechanics of materials under axial loading, torsion, bending, and combined loading.
Draw axial force, torque, shear and moment diagrams of simple members subject to combined loading.
Compute stresses and strains in simple members subject to axial loading, torsion, bending, and combined loading.
Compute deflection of beams.
Compute buckling load of compressive members.
Design components to meet desired needs in terms of strength and deflection.

Prerequisites By Topic: Equilibrium Mechanics, Calculus

Lecture Topics: Stresses; Stress in Axially Loaded Members (1 week)
Strains; Stress-Strain Diagram; Axial Deformation (1 week)
Torsion (1 week)
Shear Force and Bending Moment Diagrams (1 week)
Bending Stress in Beams (1 week)
Transverse Loading and Shearing Stress in Beams (1 week)
Stresses Under Combined Loading (1 week)
Transformation of Stresses; Design of Beams (1 week)

Deflection of Beams; Statically Indeterminate Problems (1 week)
Columns (1 week)

Class Schedule: Meets for 3 hours of lecture and 1 hour of discussion each week for 10 weeks.

Computer Usage: Basic computer skills.

Laboratory Projects: See CEE 150L

Professional Component: Contributes to the design experience and Engineering Topics courses of Civil Engineering and Environmental Engineering majors.

Relationship to Program Outcomes: CE - The course relates to Program Outcomes a, c, e, and k as stated at: http://undergraduate.eng.uci.edu/degreeprograms/civil/mission
EnE - The course relates to Program Outcomes a, c, e, and k as stated at: http://undergraduate.eng.uci.edu/degreeprograms/environmental/mission

Design Content Description

Approach: The design activity involves short design problems which are also incorporated into the homework assignments. These problems address: (a) factor of safety and allowable stresses, and (b) basic considerations for the design of prismatic beams and transmission shafts. In addition, a term project involving the analysis of simple structures are assigned to encourage the students to apply all the information taught in this course.
Lectures: 100%
Laboratory Portion: 0%

Grading Criteria:

Problem Set:	15%
Midterm:	40%
Final:	45%
	100%

Estimated ABET Category Content:

Mathematics and Basic Science: ____credit units or ____%
Engineering Science: 3____credit units or __75__%
Engineering Design: __1___credit units or _25__%

Prepared by: Jann N. Yang/ Ayman Mosallam **Date:** July 2007

CEP approved: Fall 2005