CE 225 Mechanics of Deformable Bodies 3 units

USC | SONNY ASTANI DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

ABET Course Syllabus

Course Information, Textbook and Supplementary Materials

Course Description: Analysis of stress and strain; axial, flexural, and torsional behavior of slender bars; elastic deflections; combined stresses; introduction to elastic stability and energy methods.

Required for: BSCE, BSCE Structural, BSCE Building Science, and BSCE Environmental

Prerequisites: CE 205 Statics

Co-Requisite: none

Required Textbook: Beer, Johnston & DeWolf, *Mechanics of Materials*, 4th ed. (2006)

Reference: none

Topics Covered	Learning Outcomes
Analysis of stress and strain; flexual and torsional behavior of slender bars; elastic deflections; combined stresses; introduction to elastic stability and energy methods	Students will understand the following topics, and perform analyses and calculations in these areas of study: 1. Internal forces of members subjected to axial and torsional loads 2. Stress and strain, 1-D and generalized Hooke's Law Stresses, strains and deformations of axially loaded members 3. Stresses, strains and rotations of torsionally loaded circular bars 4. Normal and shear bending stresses in beams 5. Combined stresses, Mohr's circle 6. Beam Deflections in statically determinate and indeterminate problems 7. Design of beams subjected to vertical, horizontal and moment loads
Analysis of the internal forces and moments of a structure	8. Determine the axial forces of both statically determinate and indeterminate members 9. Determine the axial torques in both statically determinate and indeterminate circular solid and hollow shafts 10. Determine the internal shears, moments and axial force reactions in beams, and draw the Shear and moment diagrams
Analysis of stress	11. Determine the internal stresses of statically determinate and indeterminate members 12. Determine the internal stresses of statically determinate and indeterminate circular solid and hollow shafts 13. Determine the normal and shear bending stresses in rectangular beams, beams with flanges and built up beams of various shapes 14. Determine the principal and maximum shear stresses by the transformation formula and/or Mohr's circle for plane stress

Topics Covered	Learning Outcomes
Deflections in a loaded beam	15. Calculate beam deflections by direct integration, superposition and moment-area methods 16. Analyze the statically indeterminate beams

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Lecture and Lab Schedule			
Lecture		**Lab**	
Sessions per Week	Duration per Session	Sessions per Week	Duration per Session
2	1.5 hours	n/a	

Relation of Course Objectives to Program Outcomes

The Civil Engineering program is designed to teach beyond the technical content of the curriculum and prepare the students to utilize what they learn in a professional setting.

This course contributes to the program outcomes as outlined in the adjacent table.

Course Contribution to Program Outcomes (a-k)	✓ Key
a. An ability to apply knowledge of mathematics, science, and engineering. i. Recognition of the need for, and an ability to engage in life-long learning.	✓

Course Coordinator: Dr. Vincent W. Lee
Professor of Civil Engineering

Date: Fall 2014