



ANTELOPE VALLEY COLLEGE

Academic Affairs
Course Outline of Record

Academic Affairs Only

- New Course
- COR Revision
- X COR Update 2/14/08
- Pre Req/Advisories
- Other Changes
- Effective Date

COURSE SUBJECT & NUMBER: ENGR 220

COURSE NAME: *Strength of Materials

COURSE UNITS: 3 **COURSE HOURS:** 3 hours weekly

COURSE REQUISITES: *(Follow format of similar courses found in the college catalog.)*

Prerequisite: Completion of ENGR 210.

Corequisite: Concurrent enrollment in ENGR 220L.

Advisory: Concurrent enrollment in ENGR 220PS.

COURSE DESCRIPTION: *(Write a short paragraph providing an overview of topics covered. Be sure to identify target audience--transfer, major, GE, degree/certificate, etc. If repeatable, state the number of times at end of description.)*

Stresses and strains under axial, shearing, and torsional forces; flexural stresses and deflections of simple beams; columns and combined stresses. Failure theories, statically indeterminate problems, and energy methods will be considered.

(CSU, UC, AVC)

COURSE OBJECTIVES: *(Use Bloom's taxonomy to formulate concise, performance-based measurable objectives common to all students. Objectives must be closely aligned with course content, assignments, and methods of evaluation.)*

Upon completion of course, the successful student will be able to:

1. Solve typical problems alluded to in strength of materials.
2. Mathematically model and predict allowable stresses and deflections in:
 - A. Determinant structures
 - B. Indeterminant structures
3. Read and apply structural literature to analysis of stress analysis problems.
4. Listen to structural lectures and apply these lectures to stress analysis problems.
5. Increase the ability to read, comprehend, and apply structural engineering concepts to the analysis of structural problems.

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COURSE CONTENT: *(Enter course content in terms of specific topics or a specific body of knowledge that each instructor must cover. Put topics in outline form with major and minor headings. Title 5 requires that each instructor must cover all material listed below.)*

- I. Stress (axial, shear, bearing), fatigue
- II. Hooke's Law in force-displacement, stress-strain
- III. Poisson's Ratio, axial deflections
- IV. Torsion stresses and rotation of round, solid, and thin-walled sections.
- V. Support reactions, shear, and BM diagrams
- VI. Bending stresses and strains including composite beams
- VII. Shear flow and shear center
- VIII. Mohr circle, principal stress, maximum shear stresses
- IX. Strength criteria
- X. Deflection, indeterminate beams, moment area
- XI. Indeterminate structures; superposition, force method.
- XII. Buckling
- XIII. Energy theorems including Castigliano's Theorem and Maxwell's Law

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TYPICAL HOMEWORK ASSIGNMENTS: READING, WRITING, COMPUTATIONAL, OTHER

This information is necessary for all credit courses. Assignments should be closely related to course objectives, content, and methods of evaluation. (See sample of a "Model Outline" in the AP&P Standards & Practices handbook.) Include a range of assignments (minimum of three) from which faculty may choose when designing their syllabus.

1. Describe nature and frequency of typical reading assignments if applicable; note if any are required:

Reading may include approximately 30 pages from the textbook per week.

2. Describe nature and frequency of typical writing assignments if applicable; note if any are required:

N/A.

3. Describe nature and frequency of typical computational assignments if applicable; note if any are required:

Most of the assignments involve calculations utilizing algebra, trigonometry, and elementary calculus to solve structural problems.

4. Describe other types of homework assignments that students may be asked to complete; note if any are required:

5. Describe those critical thinking skills that are derived from assignments listed above; be sure that they reflect course objectives.

Critical thinking consists of applying principles of mechanics to strength of materials problems typically axial, bending, torsion, shear, and pressure vessels.

6. For categories 1-4, describe the estimated time per week it would take a student to complete homework assignments.

Title 5 uses the Carnegie formula for establishing units using a 2:1 ratio as follows: 1 hr. lecture = 2 hrs .homework; 2 hrs. lecture = 4 hrs .homework; etc. For example: reading textbook—2 hours; writing reports—3 hours.

Reading: 2 hours of reading per week

Writing:

Computational: Typically 5 hours of outside work per week.

Other:.

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METHODS OF INSTRUCTION: *(Methods must be consistent with content and appropriate to objectives; state in terms of what instructor will be doing in order to present course content to students: for example, lecture, demonstration, facilitate group work, etc. Do not list specific instructional equipment.)*

Mainly lecture with some demonstrations.

METHODS OF EVALUATION: *(These must be clearly related to course content, assignments, and objectives in order to comply with Title 5 requirements. Describe what instructor will be looking for when evaluating various assignments and tests in order to determine whether students have met course objectives. Grades must be based on demonstrated proficiency in subject matter and determined, where appropriate, by essays, objective and essay tests, research papers or projects, problem solving exercises, or skills' demonstrations.)*

Evaluation will be through the use of tests, a final exam, and homework.
All the assignments will consist of mathematical modeling of structures to determine stress and deflections under different loads followed by failure analysis.

Suggested Texts or other Instructional Materials *(list several when possible; include title, author, publisher, date, and latest edition.)*

Title: Mechanics of Materials, 7th Edition, 2008

Author: Hibbeler

Publisher: Prentice-Hall