

1. Department, Course Number, and Course Title:

CIVIL & MECHANICAL ENGINEERING

CE/ME205 STRENGTH OF MATERIALS I (4)

2. Designation: Required Elective
Lower Division Upper Division

3. Course Description: Stresses and strains under axial, shearing, and torsional forces; flexural stresses and deflections of simple beams; columns; and combined stresses.

4. Prerequisites: CE/ME 201 (Statics)
Topics: Equilibrium of forces; reactions of simple structures and machines; analysis of simple trusses, frames, and machines; moments of inertia of areas; Mohr's circle

5. Text and Materials: F. P. Beer, E. R. Johnston, Jr., and J. T. DeWolf, Mechanics of Materials, Third Edition, McGraw-Hill, 2002.

6. Course Objectives: Students will become familiar with the basic principles of and techniques in the analysis and design of simple structural and mechanical members, subjected to static loads.

Course Outcomes

- ability to analyze and/or design simple systems subjected to normal stress, shearing stress, and bearing stress
- ability to analyze and/or design simple systems, including statically indeterminate systems, subjected to axial loading
- ability to analyze and/or design simple cylindrical shafts, including statically indeterminate systems, subjected to torsion
- ability to analyze and/or design simple systems subjected to bending—bending and shear stress
- ability to find the slope and deflection of simple beams
- ability to find principal stress and strain—plane stress/strain transformations
- ability to find buckling loads for columns with various end conditions
- ability to work independently

7. Topics Covered: (in Order of Presentation)

- Concept of stress; normal, shearing, and bearing (1 session)
- Stress and strain in axial loading (2 sessions)
- Torsion of cylindrical shafts (2 sessions)
- Bending moment and shear forces (2 sessions)
- Bending and shear stress (2 sessions)
- Transformation of plane stress and strain, Mohr's circle (3 sessions)
- Deflection of beams; double integration and moment-area methods (4 sessions)
- Introduction to energy methods, buckling of columns (2 sessions)
- Examinations (2 sessions), plus final examination (2.5 hours)

8. Class Schedule: Number of Sessions per week: 2
Duration of each session: 1 hour 40 minutes

9. Contribution of course to meeting the professional component:

This course is part of the one year (48 quarter units) of Basic Mathematics and Science.

Engineering Science: 3 units
Engineering Design 1 unit

10. Relationship of course to program objectives:

This course relates to the program objectives by contributing to the following measurable outcomes at the level indicated for all engineering graduates:

Knowledge outcomes:

- an ability to apply knowledge of mathematics, science, and engineering (abet a)
- the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context (abet h)
- a knowledge of how mechanical engineering integrates into inter-disciplinary systems

Skill outcomes:

- an ability to communicate effectively (abet g)
- an ability to think in a logical sequential process

Attitudes Outcome:

11. Prepared by:

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