

AME 204: Strength of Materials

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Office Hours: TBD

Office: Covid-19

Web: **Blackboard**

Class Hours: T/Th 3:30-4:50pm and Fr 1:00-1:50

Class Room: Probably not applicable

Course Description

Strength of Materials is a first course in the field of solid mechanics. Studying the properties and behaviors of materials is crucial in prediction of structural failure in any industry application. This course provides principles of mechanics and their application to analyze basic engineering problems.

Learning Objective

Apply the concept of stress and strain deflection to various mechanical structures; Analyze and interpret tension, shear, bending, torsion, buckling and combined loads; Employ a strength-based design approach; Analyze statically indeterminate structures; Utilize energy methods to analyze structural members; Develop a comprehensive methodical strategy to solve real-world engineering problems.

Required Materials

Textbook: Beer, F., Johnston, E.R., DeWolf, J., and Mazurek, D.F. Mechanics of Materials., 7th Edition

Also, course notes will be made available online.

A scientific calculator is useful.

Prerequisites

Statics: AME 201 or CE 205.

Grading Policy

- 30% Final Exam.
- 20% Mid-Term Exam 1 (in class).
- 20% Mid-Term Exam 2 (in class).
- 30% Homework (Roughly weekly).

Grading scale: A (93-100); A- (90-92.99); B+ (88-89.99); B (83-87.99); B- (80-82.99); C+ (78-79.99); C (73-77.99); C- (70-71.99); D+ (68-69.99); D (63-67.99); D- (60-62.99); F (59.99 and below).

The letter grades are based on a class average performance of B. If the mean falls below the grade cutoffs of B, the grades will be curved to the benefit of the students.

Course Schedule

Week 01, 01/18 - 01/22: Introduction; review of statics; normal stress.

Week 02, 01/25 - 01/29: Shear and contact stress; oblique planes; strain.

Week 03, 02/01 - 02/05: Stress strain curve; Poissons ratio; shear modulus; factor of safety.

Week 04, 02/08 - 02/12: Axial members.

Week 05, 02/15 - 02/19: Indeterminate structures; thermal effects; stress concentrations; generalized Hooke's law.

Week 06, 02/22 - 02/26: Torsion; **Midterm exam on Thursday; covers topic from Week 1-6.**

Week 07, 03/01 - 03/05: Torsional members; power transmission; thin-walled tubes.

Week 08, 03/08 - 03/12: Shear and moment diagrams; bending; No class on Friday (wellness day).

Week 09, 03/15 - 03/19: Composite beams and design; transverse shear.

Week 10, 03/22 - 03/26: (No class Tuesday; wellness day); thin walled members.

Week 11, 03/29 - 04/02: Stress and strain transformation; combined loading; theory of failure.

Week 12, 04/05 - 04/09: **Midterm 2 on Tuesday; covers topics from Week 7-11.** Deflection of beams.

Week 13, 04/12 - 04/16: Deflection of beams; Buckling of columns.

Week 14, 04/19 - 04/23: Buckling of columns; Energy methods.

Week 15, 04/26 - 04/30: Energy methods (Thursday is the last day of class).

Week 16, 05/03 - 05/07: Study Period.

- wrinkling in plates, microstructure in materials, and folding origami.

Week 17, 05/10 - 05/14: **Final Exam: This will be comprehensive.**