

AME 204: Mechanics of Materials and Structures

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Office Hours: TBD

Office: OHE 430

Web: **Blackboard**

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

Class Room: SOS B4

Course Description

Mechanics of Materials and Structures 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; Learn the basic mechanics of plates, shells, and the dynamics of structures. 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., 8th 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, 01/10 - 01/14: Introduction; review of statics; normal stress.

Week 02, 01/17 - 01/21: Shear and contact stress; oblique planes; strain.

Week 03, 01/24 - 01/28: Stress strain curve; Poissons ratio; shear modulus; factor of safety.

Week 04, 01/31 - 02/04: Axial members.

Week 05, 02/07 - 02/11: Indeterminate structures; thermal effects; stress concentrations; generalized Hooke's law.

Week 06, 02/14 - 02/18: Torsion; **Midterm exam on Thursday; covers topic from Week 1-6.**

Week 07, 02/21 - 02/25: Torsional members; power transmission; thin-walled tubes.

Week 08, 02/28 - 03/04: Shear and moment diagrams; bending; No class on Friday (wellness day).

Week 09, 03/07 - 03/11: Composite beams and design; transverse shear.

Week 10, 03/14 - 03/18: **Spring Recess**

Week 11, 03/21 - 03/25: Stress and strain transformation; combined loading; theory of failure.

Week 12, 03/28 - 04/01: **Midterm 2 on Tuesday; covers topics from Week 7-11.** Deflection of beams.

Week 13, 04/04 - 04/08: Deflection of beams; Buckling of columns.

Week 14, 04/11 - 04/15: Buckling of columns.

Week 15, 04/18 - 04/22: Introduction to plates and shells.

Week 16, 04/25 - 04/29: Introduction to structural dynamics. (Thursday is the last day of class).

Week 17, 05/02 - 05/06: Study Period.

Week 18, 05/09 - 05/13: **Final Exam: This will be comprehensive.**

Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” <https://policy.usc.edu/scampuspart-b/>. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

Support Systems:

Student Counseling Services (SCS) - (213) 740-7711 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

<https://engemannshc.usc.edu/counseling/>

National Suicide Prevention Lifeline - 1-800-273-8255

Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. <http://www.suicidepreventionlifeline.org>

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-4900 - 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender-based harm. <https://engemannshc.usc.edu/rsvp/>

Sexual Assault Resource Center

For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: <http://sarc.usc.edu/>

Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086

Works with faculty, staff, visitors, applicants, and students around issues of protected class. <https://equity.usc.edu/>

Bias Assessment Response and Support

Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. <https://studentaffairs.usc.edu/bias-assessment-response-support/>

The Office of Disability Services and Programs

Provides certification for students with disabilities and helps arrange relevant accommodations. <http://dsp.usc.edu>

Student Support and Advocacy – (213) 821-4710

Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. <https://studentaffairs.usc.edu/ssa/>

Diversity at USC

Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. <https://diversity.usc.edu/>

USC Emergency Information

Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible, <http://emergency.usc.edu>

USC Department of Public Safety – 213-740-4321 (UPC) and 323-442-1000 (HSC) for 24-hour emergency assistance or to report a crime.

Provides overall safety to USC community. <http://dps.usc.edu>