

USC Viterbi

School of Engineering
*Sonny Astani Department
of Civil and Environmental
Engineering*

CE 225 Mechanics of Deformable Bodies

Units: 4

Lecture: Mon, Wed 10:00-11:50 am

Discussion: Fri 10:00-11:50 am

Location: TRO 100 & Online

Instructor: Qiming Wang

Office: BHE 222

Office Hours: Tuesday, Friday 3-5 PM

Contact Info: qimingw@usc.edu

Teaching Assistant: TBD

Office:

Office Hours:

Contact Info:

IT Help: TBD

Hours of Service:

Contact Info:

Course Description

Catalogue 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.

Extended Course Description

CE225 – Mechanics of Deformable Bodies presents a full range of topics with the goal of providing students with a fundamental understanding of stress and strain of engineering structures. Students will learn the analysis of stress and strain, axial, flexural, and torsional behavior of slender bars, elastic deflections, combined stresses, and introduction to elastic stability and energy methods.

Learning Objectives and Outcomes

This course will cover the design of beams subjected to vertical, horizontal, and moment loads. Students will understand the design process and learn approaches used to solve various engineering problems that are representative of those found in a professional environment. They will practice decision-making skills as they apply their knowledge of basic sciences, mathematics, and the engineering sciences to convert resources optimally to meet the stated needs of a project.

Recommended Preparation: CE215 Statics and Dynamics.

Course Notes

Lecture notes written by the instructor will be distributed to students through the blackboard system (blackboard.usc.edu) prior to the corresponding lectures. The lecture notes will cover the essential contents and supplementary information of the lectures. The lecture notes will be treated as reading materials to support the lectures.

Reference Materials

The following textbook is recommended for the course:

1. F. P. Beer, E. R. Johnston, J. T. DeWolf & D. F. Mazurek, "Mechanics of Materials" 6th ed, McGraw-Hill. ISBN-13: 9780073380285 [This book will be used in the course]
2. Barry J. Goodno and James M. Gere, Mechanics of Materials, 9th ed., Cengage Learning, ISBN-13: 9781337093347

Description and Assessment of Assignments

Each assignment will include 4-5 problems related to the corresponding lecture. The assignment may take one of the following three forms: (1) analysis problems with analytical answers, (2) analysis problems with numerical and graphical answers, or (3) writing essays or report on the related topics. These assignments will allow students to integrate the lecture and reading materials to demonstrate their related knowledge. The grading rubric will follow 10 points for each assignment.

Grading Breakdown

Content	Points	% of grade
Homework (12)	12x10=120	20
Take home Quiz (5)	5x100=500	20
Midterm exam (2)	2x100=200	30
Final exam (1)	100	30
Total		100

Grading Scale

Course final grades will be determined using the following scale

A 95-100

A-	90-94
B+	87-89
B	83-86
B-	80-82
C+	77-79
C	73-76
C-	70-72
D+	67-69
D	63-66
D-	60-62
F	59 and below

Assignment Rubrics

10 points for each assignment

Assignment Submission Policy

The assignment should be submitted in the hand-writing paper during the class or electronic PDF via email before the deadline described in each assignment.

Grading Timeline

The assignment will be graded and returned to the students following the course schedule table.

Additional Policies

Late assignments will not be accepted. Students should email the instructor in advance when they are absent for a lecture. Absences for reasons of a religious holiday, serious illness, death in the student's immediate family, or required participation in university-sponsored activities are, with the appropriate documentation, considered excused absences.

Course Schedule: A Weekly Breakdown

Week	Date	Lecture	Topics	Readings	Assign	due
1	1/18		No lecture (Martin Luther King Day)			
	1/20	1	Concept of stress	Lecture note 1, Beer Ch1	H1	
	1/22		Discussion (TA)			
2	1/25	2	Axial load	Lecture note 2, Beer Ch2	H2	H1
	1/27	3	Axial load	Lecture note 3, Beer Ch2		
	1/29		Discussion (TA)		Q1	
3	2/1	4	3D Hook's law	Lecture note 4, Beer Ch2	H3	H2, Q1
	2/3	5	Normal & shear stresses	Lecture note 5, Beer Ch2		
	2/5		Discussion (TA)			
4	2/8	6	Torsion	Lecture note 6, Beer Ch3	H4	H3
	2/10	7	Torsion	Lecture note 7, Beer Ch3		
	2/12		Discussion (TA)			
5	2/15		No lecture (President's day)			
	2/17		Midterm exam #1			
	2/19		Discussion (TA)			
6	2/22	8	Bending stress in beams	Lecture note 8, Beer Ch4	H5	H4
	2/24	9	Bending stress in beams	Lecture note 9, Beer Ch4		
	2/26		Discussion (TA)		Q2	
7	3/1	10	Bending stress in beams	Lecture note 10, Beer Ch5	H6	H5, Q2
	3/3	11	Shear stress in beams	Lecture note 11, Beer Ch6		
	3/5		Discussion (TA)			
8	3/8	12	Shear stress in beams	Lecture note 12, Beer Ch6	H7	H6
	3/10	13	Shear stress in beams	Lecture note 13, Beer Ch6		
	3/12		No discussion class (Wellness day)		Q3	
9	3/15	14	Transformation of stress	Lecture note 14, Beer Ch7	H8	H7, Q3
	3/17	15	Transformation of stress	Lecture note 15, Beer Ch7		
	3/19		Discussion (TA)			
10	3/22	16	Mohr's circle	Lecture note 16, Beer Ch7		H8
	3/24		Midterm exam #2			
	3/26		Discussion (TA)			
11	3/29	17	Deflection of beams	Lecture note 17, Ch9	H9	
	3/31	18	Deflection of beams	Lecture note 18, Ch9		
	4/2		Discussion (TA)			
12	4/5	19	Deflection of beams	Lecture note 19, Ch9	H10	H9
	4/7		No class (Wellness day)			
	4/9		Discussion (TA)		Q4	
13	4/12	20	Deflection of beams	Lecture note 20, Ch9	H11	H10, Q4
	4/14	21	Stability of columns	Lecture note 21, Ch10		
	4/16		Discussion (TA)			
14	4/19	22	Stability of columns	Lecture note 22, Ch10	H12	H11
	4/21	23	Energy-based method	Lecture note 23, Ch11		
	4/23		Discussion (TA)		Q5	
15	4/26	24	Energy-based method	Lecture note 24, Ch11		H12, Q5
	4/28	25	Course review	Lecture note 25		
	4/30		No discussion class (Wellness day)			
16	5/3-5/5		Study day			
	5/7		Final Exam			

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” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific-misconduct.

Support Systems:

Student Health Counseling Services - (213) 740-7711 – 24/7 on call
engemannshc.usc.edu/counseling

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

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call
suicidepreventionlifeline.org

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-4900 – 24/7 on call
engemannshc.usc.edu/rsvp

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) | Title IX - (213) 740-5086
equity.usc.edu, titleix.usc.edu

Information about how to get help or help a survivor of harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants. The university prohibits discrimination or harassment based on the following protected characteristics: race, color, national origin, ancestry, religion, sex, gender, gender identity, gender expression, sexual orientation, age, physical disability, medical condition, mental disability, marital status, pregnancy, veteran status, genetic information, and any other characteristic which may be specified in applicable laws and governmental regulations.

Bias Assessment Response and Support - (213) 740-2421
studentaffairs.usc.edu/bias-assessment-response-support

Avenue to report incidents of bias, hate crimes, and microaggressions for appropriate investigation and response.

The Office of Disability Services and Programs - (213) 740-0776
dsp.usc.edu

Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

USC Support and Advocacy - (213) 821-4710
studentaffairs.usc.edu/ssa

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC - (213) 740-2101
diversity.usc.edu

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

dps.usc.edu, emergency.usc.edu

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call

dps.usc.edu

Non-emergency assistance or information.