

# 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 10:00-10:50 am

**Location:** THH 118

**Instructor:** Qiming Wang

**Office:** BHE 222

**Office Hours:** Mon, Wed 3-5 PM

**Contact Info:** [qimingw@usc.edu](mailto: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	30
Midterm exam (2)	2x100=200	40
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	1/10	1	Concept of stress	Lecture note 1, Beer Ch1	H1	
	1/12	2	Stress, Axial load	Lecture note 2, Beer Ch2		
	1/14		Discussion (TA)			
2	1/17		No lecture (Martin Luther King's Birthday)			
	1/19	3	Axial load	Lecture note 3, Beer Ch2	H2	H1
	1/21		Discussion (TA)			
3	1/24	4	3D Hook's law	Lecture note 4, Beer Ch2	H3	H2
	1/26	5	Torsion	Lecture note 5, Beer Ch2		
	1/28		Discussion (TA)			
4	1/31	6	Torsion	Lecture note 6, Beer Ch3	H4	H3
	2/2	7	Torsion & Bending	Lecture note 7, Beer Ch3		
	2/4		Discussion (TA)			
5	2/7		Midterm exam #1			
	2/9	8	Bending stress in beams	Lecture note 8, Beer Ch4		
	2/11		Discussion (TA)			
6	2/14	9	Bending stress in beams	Lecture note 9, Beer Ch4	H5	H4
	2/16	10	Bending stress in beams	Lecture note 10, Beer Ch4		
	2/18		Discussion (TA)			
7	2/21		No lecture (President's day)			
	2/23	11	Analysis of beams for bending	Lecture note 11, Beer Ch5	H6	H5
	2/25		Discussion (TA)			
8	2/28	12	Shear stress in beams	Lecture note 12, Beer Ch6	H7	H6
	3/2	13	Shear stress in beams	Lecture note 13, Beer Ch6		
	3/4		Discussion (TA)			
9	3/7	14	Transformation of stress	Lecture note 14, Beer Ch7	H8	H7
	3/9	15	Mohr's circle	Lecture note 15, Beer Ch7		
	3/11		Discussion (TA)			
10	3/14		No lecture (spring recess)			
	3/16		No lecture (spring recess)			
	3/18		No discussion (spring recess)			
11	3/21	16	Mohr's circle	Lecture note 16, Beer Ch7		H8
	3/23		Midterm exam #2			
	3/25		Discussion (TA)			
12	3/28	17	Deflection of beams	Lecture note 17, Ch9	H9	
	3/30	18	Deflection of beams	Lecture note 18, Ch9		
	4/1		Discussion (TA)			
13	4/4	19	Deflection of beams	Lecture note 19, Ch9	H10	H9
	4/6	20	Stability of columns	Lecture note 20, Ch9		
	4/8		Discussion (TA)			
14	4/11	21	Stability of columns	Lecture note 21, Ch10	H11	H10
	4/13	22	Stability of columns	Lecture note 22, Ch10		
	4/15		Discussion (TA)			
15	4/18	23	Energy-based method	Lecture note 23, Ch11	H12	H11
	4/20	24	Energy-based method	Lecture note 24, Ch11		
	4/22		Discussion (TA)			
16	4/25	25	Energy-based method (advanced)	Lecture note 25, Ch11		H12
	4/27	26	Course review	Lecture note 26		
	4/29		Discussion (TA)			
17	4/30-		Study day			

	5/3					
	5/10		Final Exam: May 6, 9:50am-11:50am			

## 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](http://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](http://policy.usc.edu/scientific-misconduct).

### Support Systems:

*Student Health Counseling Services - (213) 740-7711 – 24/7 on call*  
[engemannshc.usc.edu/counseling](http://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](http://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](http://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](http://equity.usc.edu), [titleix.usc.edu](http://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](http://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](http://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](http://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](http://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](https://dps.usc.edu), [emergency.usc.edu](https://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](https://dps.usc.edu)

Non-emergency assistance or information.