ME C85/CE C30 – Section 1
Introduction to Solid Mechanics

Faculty: Grace Gu 6177 Etcheverry Hall, email: ggu@berkeley.edu
Office Hours: Friday 3:00-5:00 pm, or by appointment

Graduate Student Instructors:
Zilan Zhang shilan@berkeley.edu
Office Hours: Sunday 2-4 pm zoom link: https://berkeley.zoom.us/j/3315399172
Kahraman Demir kahraman_demir@berkeley.edu
Office Hours: Tuesday 10 am-12 pm zoom link: https://berkeley.zoom.us/j/5420010521

Lectures: Monday, Wednesday and Friday 2 – 3 pm, Zoom

Discussion Sections: (Discussions will begin on September 1)
Tuesday 9-10 am over zoom.
Thursday 12-1 pm: TBD (will be discussed in first week of class)

Course Content: A review of equilibrium for particles and rigid bodies. Application to truss structures. The concepts of deformation, strain and stress. Equilibrium equations for a continuum. Elements of the theory of linear elasticity. The states of plane stress and plane strain. Solution of elementary elasticity problems (beam bending, torsion of circular bars). Euler buckling in elastic beams.

Course Objectives: By the end of this course, students should be able to:
- Correctly draw free-body diagrams (yes, this really is important enough to include here!)
- Apply the equations of equilibrium to two- and three-dimensional solids
- Understand the concepts of stress and strain
- Solve simple boundary value problems in linear elastostatics (tension, torsion, beam bending)

Learning Goals: This course should support students in achieving the following student learning outcomes associated with the Department's ABET Accreditation. By the time that they graduate, students should have:
- An ability to apply knowledge of mathematics, science, and engineering
- An ability to identify, formulate, and solve engineering problems

Prerequisites: Physics 7A; Math 53 & 54 (Math 54 may be taken concurrently). It is expected that you are familiar with and can readily perform basic vector manipulation in 2D and 3D (addition, dot product, cross product, scalar triple product, component representation, angle between vectors, etc.) so we will move quickly into problems involving equilibrium of rigid bodies.

Text: *Statics and Mechanics of Materials, 5e,* R.C. Hibbeler, Pearson (2017), Student Value Edition. The version available at the bookstore has an access code for Mastering Engineering, the software developed to accompany this text. You may also purchase access to Mastering Engineering separately. You should have the option of purchasing the e-book as well, but in any event, you will have to purchase access to Mastering.

Reading: The calendar for this course has a (tentative) list of chapters and sections in the text that are to be addressed in each lecture. You are expected to have read this material prior to attending the lecture so that you are prepared to intelligently engage in in-class discussions that may occur.

Mastering Engineering: "Mastering" is an online learning system that is directly associated with the text and is integrated into the bCourses website. It is where students will find most of their homework, an electronic copy of the text, and a "Study Area" with a large number of problems whose solutions are available in print or video form.

Homework: Solving problems is the most effective way to learn the material and techniques covered in this course. As such, homework with as many as 10 problems will be assigned weekly. The main homework assignments will usually be due on Sundays. Your answers are to be entered in Mastering Engineering by 11:59 pm on the day that it is due. No late homework will be accepted. **To compensate for things out of your control that happens (family emergencies, flu, etc.), two of your lowest homework assignments will be dropped in calculating your overall grade.** Overall, homework will account for 20% of the course grade. Additionally, due to the pandemic, we will be flexible for students who are experiencing illness or other challenges related to COVID-19. If you run into difficulties during these challenging times, please reach out to Prof. Gu and/or the GSIs.

The campus expectation is that students will spend about two hours studying for every hour of lecture for a class. This matches, more or less, my expectation of work that you should be doing as we progress through the term. As such, you should expect that doing the homework will take some time. Don't wait until the last minute to start. I strongly encourage you to establish study groups for this course. Your group may meet to discuss the homework problems, but every member of the group should have tried to solve the problem(s) individually before meeting to discuss the solutions. You should not expect that your group will provide the solutions to problems for you. Doing so will likely result in good homework grades, and poor exam grades. Note that many problems in Mastering Engineering have different problem parameters for each student, so knowing the "correct" numerical solution for one student may not work for others.

Exams: There will be two midterm exams. Each midterm is worth 20% of the course grade. There will also be a 3-hour final exam from **3-6 pm on Thurs, December 17**. The final exam is worth 40% of the course grade. Availability for lectures, laboratories, and all examinations is required for enrollment in the class. **Please see professor for accommodation of religious beliefs, disabilities, and other special circumstances before the end of the second week of classes for any foreseeable issues.**

To request reconsideration of the score that you receive on an exam problem you must: (1) Provide a clear statement indicating why you think that we have taken points off incorrectly. In this, you should identify specific areas of concern that we should pay attention to in reviewing your problem; (2) Submit your request for reconsideration in lecture or discussion within one week of getting the exam back. **If you submit a request for a re-grade of an exam problem, we will re-grade your entire exam.**

Honor code: The student community at UC Berkeley has adopted the following Honor Code: 'As a member of the UC Berkeley community, I act with honesty, integrity, and respect for others.' It is my expectation is that you will adhere to this code. Please see the ASUC wesite: http://www.asuc.org/honorcode/index.php

This is an admirable aspiration, but it's easy to lose sight of what 'honesty, integrity, and respect for others' really means. Here's a suggestion, paraphrased from a colleague:

> If even a small voice within you says "I would not want my fellow students, parents, or professor to know about this," then stop! Ask yourself what matters more, the short-term gain you were about to grab, or the respect of others, and your own self-respect and honor, all of which must be earned and jealously guarded over the long term.

As noted above, you are encouraged to work in groups in completing your homework assignments, so there is no problem in adhering to the honor code there. More problematic for this course are the exams,

where there have in the past been cases of students sharing information during an exam, or of one student looking at another student's paper in order to "get the right answer." Such cases are very serious, and will be treated as such under the policies described in the Student Affairs web page on student conduct: http://sa.berkeley.edu/code-of-conduct.

Relationship to the ABET Student Educational Outcomes:

- an ability to apply knowledge of mathematics, science, and engineering
- an ability to identify, formulate, and solve engineering problems

Extra Credit: Every lecture, I will randomly select students to answer a couple questions throughout class. If you are present and answer the question (it doesn't need to be correct), you will get a check for the day. If you are not present, you will receive an absent note. At the end of the semester, if you receive more checks than absent, you will receive 1% extra credit to your final grade.

Grading Policies:

Course Element	Contribution
Homework	20%
Midterm Exams	2 @ 20% each
Final Exam	40%

Tentative calendar

Week	Lect. #	Day	Month	Date	Chapter/Section from Text	HW/Exam
1	1	Wed.	Aug	26	Introduction	
	2	Fri.	Aug	28	Chapters 1 & 2	Intro to Mastering
2	3	Mon.	Aug	31	Chapter 2 & 3	
	4	Wed.	Sept	2	Chapter 3 & Sections 4.1 – 4.3	
	5	Fri.	Sept	4	Sections 4.4 – 4.6	HW 1 – Ch 2 & 3
3	6	Mon.	Sept	7	Holiday/No class	
	7	Wed.	Sept	9	Sections 4.7 – 4.8	
	8	Fri.	Sept	11	Sections 5.1 – 5.2	HW 2 – Ch 4
4	9	Mon.	Sept	14	Sections 5.3 – 5.4/5.5	
	10	Wed.	Sept	16	Sections 7.1 – 7.3	
	11	Fri.	Sept	18	Sections 7.3 – 7.7	HW 3 – Ch 5
5	12	Mon.	Sept	21	Review	
	13	Wed.	Sept	23	Midterm 1 (through Ch 5)	
	14	Fri.	Sept	25	Sections 7.7 – 7.8	HW 4 – Ch 7
6	15	Mon.	Sept	28	Sections 8.1 – 8.3	
	16	Wed.	Sept	30	Sections 8.3 – 8.5	
	17	Fri.	Oct	2	Section 8.6	HW 5 – Ch 7
7	18	Mon.	Oct	5	Sections 9.1 – 9.3	
	19	Wed.	Oct	7	Section 9.4	
	20	Fri.	Oct	9	Sections 9.5 – 9.6	HW 6 – Ch 8
8	21	Mon.	Oct	12	TBD/buffer	
	22	Wed.	Oct	14	Sections 6.1 – 6.3	
	23	Fri.	Oct	16	Sections 6.3 – 6.5	HW 7 – Ch 9
9	24	Mon.	Oct	19	Sections 10.1 – 10.2	
	25	Wed.	Oct	21	Sections 10.2 – 10.4	
	26	Fri.	Oct	23	Section 10.5	HW 8 – Ch 6 & 10
10	27	Mon.	Oct	26	Review	
	28	Wed.	Oct	28	Midterm 2 (Ch 6 – 10)	
	29	Fri.	Oct	30	Sections 11.1 – 11.4	HW 9 – Ch 10 & 11
11	30	Mon.	Nov	2	Sections 16.1 – 16.2	
	31	Wed.	Nov	4	Sections 16.2 – 16.4	
	32	Fri.	Nov	6	Section 16.5	HW 10 – Ch 11 & 16
12	33	Mon.	Nov	9	Sections 12.1 – 12.2	
	34	Wed.	Nov	11	Holiday/No class	
	35	Fri.	Nov	13	Sections 12.2; 13.1 – 13.2	HW 11 – Ch 16 & 12
13	36	Mon.	Nov	16	Section 13.2	
	37	Wed.	Nov	18	Sections 14.1 – 14.3	
	38	Fri.	Nov	20	Sections 14.5 – 14.7	HW 12 – Ch 13
14	39	Mon.	Nov	23	TBD/buffer	
	40	Wed.	Nov	25	Holiday/No Class	
	41	Fri.	Nov	27	Holiday/No Class	HW 13 – Ch 13 & 14
15	42	Mon.	Nov	30	Sections 17.1 – 17.2	
	43	Wed.	Dec	2	Sections 17.3	
	44	Fri.	Dec	4	Final review	HW 14 – Ch 17
RRR		Mon.	Dec	7	Review	
		Wed.	Dec	9	Review	
		Fri.	Dec	11	Review	Course Evaluation
		Thurs.	Dec	17	Final Exam 3-6 pm	