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

Faculty: George Johnson, 6149 Etcheverry Hall, gcjohnson@berkeley.edu
Office Hours: Wednesday 12:00-1:00, Thursday 11:30-1:30, Friday 10:00-12:00

Graduate Student Instructor: (GSI Office Hours are held in 136 Hesse Hall)
Abdulrahman (A.J.) Jbaily a.jbaily@berkeley.edu, Office Hours: TBD

Lectures: Monday, Wednesday and Friday 2 – 3, 4 LeConte Hall

Discussion Sections: (Discussions will begin on August 29)

Tuesday 5 – 6, 3109 Etcheverry	(discussion section 1)
Friday 10 – 11, 30 Wheeler	(discussion section 2)
Thursday 4 – 5, 3113 Etcheverry	(discussion section 3)

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).
The bookstore has the Student Value Edition for purchase or rental, both with an access code to MasteringEngineering (see below). Alternatively, you can purchase just an e-book with access code directly from Pearson. To do so, go to http://www.mypearsonstore.com/ and search for "Hibbeler", then find this text (he has written a bunch). If you opt to go this route, be sure to order the book associated with ***Modified*** MasteringEngineering. Finally, if you happen to have found a copy of the book somewhere else and just want to buy access to MasteringEngineering, that is also an option at the same site.

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.

MasteringEngineering: "Mastering" is an online learning system that is directly associated with the text and is integrated into the bCourses website. We are using the ***Modified*** version, which should make no differ-

ence to you unless you are buying access to it separately from the book. 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: For most students, 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 Fridays. Your answers are to be entered in MasteringEngineering by 11:59 pm on the day that it is due, and you must upload to bCourses a PDF file of the work that allowed you to arrive at your answers. Be sure to give yourself enough time to convert your work to PDF format and do the upload! If your score on an assignment is less than 85%, you will be given the option of making up some of the lost points through completion of a set of "adaptive follow-up" questions. Finally, some shorter problem sets, usually involving mainly conceptual questions, will also be assigned. These will be worth less than the main assignments and you will not need to upload your work in order to receive full credit. Overall, homework will account for up to 10% of the course grade.

My expectation is that students will spend about two hours studying for this class for every hour of lecture. 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 MasteringEngineering have different problem parameters for each student, so knowing the "correct" numerical solution for one student may not work for others.

For almost all problems assigned in this course, at least one free-body diagram (FBD) and appropriate equations are both required to receive full credit. FBD's are critical elements that indicate your understanding of the problems assigned. You may (somehow) get the right answer to a problem, but the FBD provides key information regarding your understanding. Similarly, correct identification and use of relevant equations are necessary to both obtain a solution and demonstrate your understanding. This is what you are communicating in your PDF submissions.

Learning Catalytics: We will be using software that allows you to respond to questions posed during lecture in real time via your smartphone, tablet, or laptop. There is no additional hardware necessary. Learning Catalytics is built into Mastering, so there is no need to enroll in it separately. To use it in class, go to http://www.learningcatalytics.com/ and use your Mastering user name and password.

There are three main reasons that I am using this system. It provides: 1) an immediate way for me to gauge how well the class understands the concepts being covered, 2) a way for a large class to stay engaged in the lectures, and 3) a way to start meaningful discussions during lecture. I will be monitoring whether answers are correct or not, but your course grade will not depend on whether your responses are correct. Instead, you will receive up to 5% toward your course grade if you fully participate in class. ("Fully participate" means responding to at least 75% of all questions asked after the 3rd lecture.) As we proceed through the course, if your response to a particular clicker question is wrong, I expect that you will work to understand why you responded as you did, and why your response was incorrect.

Piazza: We will be using Piazza as our primary tool for communication, so please don't send homework or concept questions to A.J. or me via email. Post questions on Piazza using the link in bCourses. Students will be able to collectively come up with an answer. Faculty may weigh in as well or will "validate" a student response. It is set up so that you can remain anonymous to your fellow classmates, though the faculty will know who posts what in order to moderate the discussions.

Exams: There will be two midterm exams, both in class, on Wednesday Sept. 27 and Wednesday Nov. 1. Each midterm is worth 25% of the course grade. There will also be a 3-hour final exam from 11:30 – 2:30 on Tuesday, December 12. The final exam is worth 35% of the course grade.

To request reconsideration of the score that you receive on an exam problem you must: (1) Clearly solve the problem on a separate sheet of paper; (2) 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; (3) Submit your request for reconsideration in lecture or discussion within one week of getting the exam back.

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.

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.

Grading Policies:

Course Element	**Contribution***
Class Participation (Learning Catalytics)	5%
Homework	10%
Midterm Exams	2 @ 25% each
Final Exam	35%

- It is our intent to grade and return material that you submit within one week.
- The lowest homework grade will be dropped in calculating its contribution to your overall course grade.
- You will receive full participation score if you respond to at least 75% of the questions asked in class after the 3rd lecture.
- *** Important Caveat**: You must pass the exams in order to pass the class. Homework and participation will not be sufficient to receive a passing grade if the exam performance is below a passing standard.

Calendar for ME C85 (as of 8/18/2017)

Week	Lect. #	Day	Month	Date	Chapter/Section from Text	HW/Exam
1	1	Wed.	Aug	23	Introduction	
	2	Fri.	Aug	25	Chapters 1 & 2	
2	3	Mon.	Aug	28	Chapter 2 & 3	
	4	Wed.	Aug	30	Chapter 3 & Sections 4.1 – 4.3	Intro to Mastering
	5	Fri.	Sept	1	Sections 4.4 – 4.6	HW 1 – Ch 2 & 3
3		Mon.	Sept	4	Labor Day	
	6	Wed.	Sept	6	Sections 4.7 – 4.8	HW 1.5
	7	Fri.	Sept	8	Sections 5.1 – 5.2	HW 2 – Ch 4
4	8	Mon.	Sept	11	Sections 5.3 – 5.4	
	9	Wed.	Sept	13	Section 5.5	
	10	Fri.	Sept	15	Sections 7.1 – 7.3	HW 3 – Ch 5
5	11	Mon.	Sept	18	Sections 7.3 – 7.5	
	12	Wed.	Sept	20	Sections 7.5 – 7.7	
	13	Fri.	Sept	22	Sections 7.7 – 7.8	HW 4 – Ch 7
6	14	Mon.	Sept	25	Review	
	15	Wed.	Sept	27	Midterm 1 (through Ch 5)	
	16	Fri.	Sept	29	Sections 8.1 – 8.3	HW 5 – Ch 7
7	17	Mon.	Oct	2	Sections 8.3 – 8.5	
	18	Wed.	Oct	4	Section 8.6	
	19	Fri.	Oct	6	Sections 9.1 – 9.3	HW 6 – Ch 8
8	20	Mon.	Oct	9	Section 9.4	
	21	Wed.	Oct	11	Sections 9.5 – 9.6	
	22	Fri.	Oct	13	Sections 6.1 – 6.3	HW 7 – Ch 9
9	23	Mon.	Oct	16	Sections 6.3 – 6.5	
	24	Wed.	Oct	18	Sections 10.1 – 10.2	
	25	Fri.	Oct	20	Sections 10.2 – 10.4	HW 8 – Ch 6 & 10
10	26	Mon.	Oct	23	Section 10.5	
	27	Wed.	Oct	25	Sections 11.1 – 11.2	
	28	Fri.	Oct	27	Sections 11.3 – 11.4	HW 9 – Ch 10 & 11
11	29	Mon.	Oct	30	Review	
	30	Wed.	Nov	1	Midterm 2 (Ch 6 – 11)	
	31	Fri.	Nov	3	Sections 16.1 – 16.2	HW 10 – Ch 11 & 16
12	32	Mon.	Nov	6	Sections 16.2 – 16.4	
	33	Wed.	Nov	8	Section 16.5	
	34	Fri.	Nov	10	Sections 12.1 – 12.2	HW 11 – Ch 16 & 12
13	35	Mon.	Nov	13	Section 12.2	
	36	Wed.	Nov	15	Sections 13.1 – 13.2	
	37	Fri.	Nov	17	Section 13.2	HW 12 – Ch 13
14	38	Mon.	Nov	20	Sections 14.1 – 14.3	
		Wed.	Nov	22	No Class – Thanksgiving	
		Fri.	Nov	24	No Class – Thanksgiving	
15	39	Mon.	Nov	27	Sections 14.5 – 14.7	
	40	Wed.	Nov	29	Sections 17.1 – 17.2	
	41	Fri.	Dec	1	Sections 17.3	HW 13 – Ch 13 & 14
RRR		Mon.	Dec	4	Review	
		Wed.	Dec	6	Review	
		Fri.	Dec	8	Review	HW 14 – Ch 17
		Tue.	Dec	12	Final Exam 11:30 – 2:30	