

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

Faculty: George Johnson, 6149 Etcheverry Hall, gjohnson@berkeley.edu
Office Hours: Wednesday 12:30-2:30, Thursday 12:00-3:00

Graduate Student Instructors: (GSI Office Hours are held in 136 Hesse Hall)
Marleigh Duncan mkduncan5@gmail.com, Office Hours: Monday 2:30-3:30, Tuesday 2-3
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Shrikant Kshirsagar shri_sagar@berkeley.edu, Office Hours: Tuesday 4-5, Wednesday 3-4

Lectures: 4:10 – 5:00 Monday, Wednesday and Friday, 105 Northgate Hall

Discussion Sections:

Tuesday 5 – 6, 3113 Etcheverry	(discussion section 1)
Thursday 5 – 6, 3113 Etcheverry	(discussion section 2)
Wednesday 11 – 12, 310 Hearst Mining	(discussion section 3)
Monday 12 – 1, 1165 Etcheverry	(discussion section 4)
Monday 5 – 6, 1165 Etcheverry	(discussion section 5)

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)

Text: *Statics and Mechanics of Materials* (a custom book based on the Third Edition of the book of the same name by R.C. Hibbeler), Pearson (2013). The book, available in local bookstores, has an enrollment code for MasteringEngineering, an online learning system that is integrated into bCourses.

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. 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 probably the most effective way to learn the material and techniques covered in this course. As such, homework will be assigned weekly and will account for up to 10% of the course grade. Homework will usually be due on Thursdays. Your answers are to be entered in MasteringEngineering by 11:55 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. Solutions will be available for you to review starting at this time. Be sure to give yourself enough time to convert your work to PDF format and do the upload! Scanners are available for you to use in the ME computer labs in 2105 and 2107 Etcheverry Hall. You can access the computers there using your CalNet ID.

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 submission of your associated paperwork for MasteringEngineering.

Learning Catalytics: We will be using software that allows you to respond to questions posed during lecture in real time via your smart phone, tablet, or laptop computer. There is no additional hardware necessary. Learning Catalytics is built into Mastering, so there is no need to enroll in it separately.

There are three main reasons that I am using this system – to provide an immediate way to gauge how well the class understands the concepts being covered, to provide a way for a large class to stay engaged in the lectures, and to provide 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 during the semester.) 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.

Quizzes: There will be a short in-class quiz (approximately 10 minutes) during class every Wednesday starting September 10. The material for each quiz will be from the previous week's lectures, "clicker questions" and homework. The quizzes will account for up to 5% of the course grade.

Exams: There will be two midterm exams, both in the evening from 7:00 – 9:00 pm, on Tuesday October 7 and Tuesday November 18, both in 2060 Valley Life Sciences Building. Each midterm is worth 22.5% of the course grade. There will also be a 3-hour final exam from 8:00 – 11:00 am, on Thursday, December 18. 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 a second time; (3) Submit your request for reconsideration in lecture or discussion within one week or 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 section of the online catalog on student conduct: <http://catalog.berkeley.edu/policies/conduct.html> .

Grading Policies:

Course Element	Contribution
Homework	10%
In-Class Quizzes	5%
Class Participation (TopHat)	5%
Midterm Exams	2 @ 22.5% each
Final Exam	35%

- It is our intent to grade and return material that you submit (homeworks, quizzes and exams) within one week.
- The lowest homework grade will be dropped in calculating the contribution to your overall course grade.
- The lowest quiz grade will be dropped in calculating the 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 throughout the semester.
- You must pass the quizzes and 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.