TAM 251: Introductory Solid Mechanics - Fall 2012

Dr. Mariana Silva
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Office: MEB 362A
Lectures: MWF, 9AM (AL1) and 10AM (AL2), 103 Talbot Laboratory
Office hours: WF, 11AM - 1PM, MEB 362 A

Discussion sections

ADA, R 8:00-8:50AM, 218 MEB, Rahul Agarwal
ADB, R 4:00-4:50PM, 153 MEB, Rahul Agarwal
ADC, T 12:00-12:50PM, 153 MEB, Ankit Saharan
ADD, T 12:00-12:50PM, 335 MEB, Shelley Goel
ADE, T 4:00-4:50PM, 135 MEB, Ankit Saharan
ADF, F 1:00-1:50PM, 335 MEB, Ankit Saharan
ADG, R 5:00-5:50PM, 153 MEB, Rahul Agarwal

Head teaching assistant

Joel Krehbiel, jkrehbi2@illinois.edu

Teaching assistants

Ankit Saharan, saharan1@illinois.edu
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Graders

Xiaoyue Chen, chen359@illinois.edu
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Special accomodations

To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact their lecturer and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES you may visit 1207 S. Oak St., Champaign, call 333-4603 (V/TDD), or e-mail a message to disability@uiuc.edu.

I-clicker

Quizzes will be administered in lectures and discussion sections via the I-Clicker system. I-Clickers may be purchased at any of the book stores and must be registered on Compass.

"Compass" website

Your grades and general announcements will be posted on Compass.

Reference textbook

Custom version (loose-leaf, three-hole punched, B&W) of "*Mechanics of Materials*" by Beer, Johnston, DeWolf and Mazurek, McGraw-Hill, **ISBN: 069781408-4**. Available at UofI Bookstore for $100.00. This price includes the *Connect Plus* access code, which is required to complete your homework assignments (see section "Required online tool"). The custom texbook has the same material as the original *Mechanics of Materials*" by Beer, Johnston, DeWolf and Mazurek, 6th edition, except for Chapter 11, that has been removed.

Required online tool - McGraw-Hill Connect

The website http://connect.mcgraw-hill.com/class/m_silva_fall_2012 contains your homework assignments and lecture materials. You will be required to enter a registration code to start using the website, which can be obtained by one of the following:

1. Purchase the custom textbook ($100.00)
   The custom textbook (ISBN 069781408-4) includes the *Connect Plus* registration code. Note that *Connect Plus* allows access to the original (colored) textbook via the online ebook until the end of the semester (you may print the ebook, however you are not able to save a copy of it).

2. Purchase the *Connect* registration code online ($39.99)
   This option is available after you press the "register now" buttom. Note that the *Connect* registration code does not give you access to the online ebook. However, this might be a good option if you are planning to borrow the original textbook from a friend or the library.

3. Purchase the *Connect Plus* registration code online ($108.75) - NOT RECOMMENDED
   This option is also available after you press the "register now" buttom. I strongly suggest you do not chose this option! It gives the same online access than option 1, without including the printed text and for a higher cost.

General guidelines

Lectures:

- Read the assigned material from the text.
- Expect an I-clicker quiz during your lecture.
- The lectures will be delivered on a Tablet-PC and their content will be saved for your future reference.

Discussion sessions:

- Discussion sections will begin on Monday, August 27.
- Discussion sessions conducted by TAs are held weekly to solve problems similar to your homework and to answer any questions about particular problems that you have.
- Expect an I-clicker quiz during your discussion section.
- Do not ask the TAs to work the homework problems before they are due.
- Do not ask the TAs to work the problems done in lecture, however you may ask specific questions, e.g. How did you go from step b to c?

Study Hall:

- A Study Hall in 429 Grainger Library is provided to answer questions you may have.
- The Study Hall will begin on Tuesday, Sept 4th. It will be staffed by the TAs, graders and myself during the time slots indicated below:

Time	Monday	Thursday	Friday
9 - 10am		Rahul	
10 - 11am		Rahul	
11 - 12am	Silva	Xin	
12 - 1pm	Silva	Ankit	
1 - 2pm	Shelley	Ankit	Xiaoyue
2 - 3pm	Xin		Ankit
3 - 4pm	Xiaoyue	Rahul	Xin
4 - 5pm	Xiaoyue	Xiaoyue	Xin

- Study Hall is intended to supplement the lectures and discussion sections.
- Do not ask the staff to work the homework problems before they are due. It is OK to ask them specific questions on the details of your attempted solutions or to work out problems that are similar to the homework problems.
- I also hold office hours in my office (MEB 362 A) on Wednesdays and Fridays from 11am to 1pm, starting from Sept 5th.

Course grades and policies

96 - 100 A+	91 - 95 A	88 - 90 A-
85 - 87 B+	81 - 84 B	78 - 80 B-
75 - 77 C+	71 - 74 C	68 - 70 C-
64 - 67 D+	59 - 63 D	55 - 58 D-
	0 - 54 F	

Online homework assignment (10%):

1. Online homework assignments will be due on **Mondays at 6 pm**. Late submission (but started before the deadline) will be penalized by 50% for each day.
2. You will receive a grade for ALL assigned online homework problems (six each week).
3. To encourage you to work through the problems and to obtain the correct solution you may revise and resubmit your solutions numerous times.
4. The online homework problems give explicit values and units to the relevant lengths, material properties, forces, et cetera, and therefore you should give your final answer with an explicit numerical value. Nevertheless, when solving a homework problem you should (to the utmost extent possible) assign symbols to all the relevant lengths, forces, material properties, et cetera, and then solve the problem symbolically. As a last step, you should substitute the value and units of each of the symbols in the symbolic formula. You are encouraged to solve all six problems symbolically. However, each week you will be asked to submit one of them (refer to section "Written homework assignment").
5. You are encouraged to print out each homework problem and derive your symbolic solution on this print out. Store these solutions for your future reference.
6. Solutions will not be posted.
7. Your lowest online homework score will be dropped. *This drop should be reserved for unexpected occurrences such as sickness or a family emergency.*

Written homework assignment (10%):

1. To teach you how to prepare your analyzes in a logical manner, you will be asked to submit one written solution from your online homework assignment each week. In this way, the TAs who grade your exams will be able to critique your work before the examinations.

2. These written homework assignments will be collected on **Mondays at the start of lecture**. You must submit your assignment in the section in which you are registered.

3. Place your submission in the appropriate folder according to your discussion section.

4. Late homework will not be accepted. **Note that assignments will not be accepted after lecture begins.**

5. Your name, lecture section and discussion section numbers must be printed in pen (legibly) on the top of each page. Staple your problem-set solutions together in the upper left corner. Your work must be arranged neatly so that it is easily read by the TAs and graders.

6. This symbolic form of working out the problems will be used by the teaching assistants in the discussion sections, by me in the lectures and by yourselves in the exams. *In the exams, I seldom give explicit values and units to the relevant quantities, and you will have to solve the exam problems using symbols!*

7. Your lowest written homework score will be dropped. *This drop should be reserved for unexpected occurrences such as sickness or a family emergency.*

Lectures (3%):

1. Quizzes will be administered via the I-clicker system.

2. 1.5% for attendence + 1.5% for correct answer

3. Your lowest quiz score will be dropped. *This drop should be reserved for unexpected occurrences such as sickness or a family emergency.*

Discussion sections (2%):

1. Quizzes will be administered via the I-clicker system.

2. 1% for attendence + 1% for correct answer

3. Your lowest quiz score will be dropped. *This drop should be reserved for unexpected occurrences such as sickness or a family emergency.* If you know that you cannot attend your discussion section for any reason, arrange with the TAs to attend another discussion section.

Midterms (45%):

1. 2 hours exam, "closed book" and "closed notes".

2. A formula sheet will be provided at the exam.

3. Your name and discussion section number must appear on the top of EACH page of the exam.

4. Midterm 1: Tuesday, October 9th, 7:00PM-9PM, Location: TBA

5. Midterm 2: Tuesday, November 13th, 7:00PM-9PM, Location: TBA

6. Conflict exams will be scheduled for students with legitimate (documented) scheduled conflicts. These are usually on the same evening but earlier than the regular exam. Actual times will be announced in lecture.

Final exam (30 %):

1. 3 hours exam, "closed book" and "closed notes".
2. A formula sheet will be provided at the exam.
3. Your name and discussion section label must appear on the top of EACH page of the exam.
4. Make-up exams will only be allowed with a major documented excuse.

Extra online homework problems:

1. You will have the option to solve extra online problems every week (total of 48 extra problems during the entire semester).
2. Each problem is worth 0.1% extra credit, hence you can get up to **4.8% extra credit** on your final grade by solving the extra problems.

Grading generalities:

1. Questions about your grades must be made within the week after the quiz, exam or HW is returned. Discuss the issue with the grader or TA who graded the problem in question and if a resolution cannot be made, then see your lecturer.
2. Questions about missing quiz/exam/HW grades must be addressed to the Head TA within the week after the quiz/exam/HW was returned to your class-mates. Make sure to routinely check your grades on compass.

Absences and excused grades:

1. Excuses from homework, quizzes and exams will be given only in one of the following circumstances:
   (a) illness;
   (b) personal crisis (e.g. automobile accident, required court appearance, death of a close relative, weather conditions which make it impossible to get to the university); and
   (c) required attendance at an official UIUC activity (e.g. varsity athletics, band concert).
   For case (a) or (b) contact the Dean of Students' Office 333-0050. (At night this number is known as the Emergency Dean). Inform your lecturer that you have done so and have the Dean send a letter explaining your situation on the appropriate letter head directly to your lecturer. For case (c) have a designated university official send a letter explaining your situation on the appropriate letter head directly to your lecturer at least one week prior to the period in question.
2. The dropped homework and quiz grades are intended for excused absences. If additional homework and quizzes are excused, then each such approved excuse will increase the number of grades that will be dropped. For example, if you have 4 excused homework absences, then your 4 lowest homework grades will be dropped.
3. An excused absence from a midterm exam will receive the score EX. At the end of the semester, midterm-exam EX scores will be replaced by a weighted average of your non-EX exam scores (midterm-exams and the final exam).
4. When possible, you will be required to attend another discussion section rather than miss your scheduled discussion section for one of the aforementioned circumstances.

Effective use of email

Email is most useful when you need to report a problem or make a request or an appointment. But it is hard to discuss concepts, equations, plots or diagrams by email. If you have difficulties solving your homework or understanding a theoretical point, then bring a copy of your equations, diagrams, et cetera, and talk to one of us in person.

I usually reply to emails within one day, but I seldom reply to emails requesting information that is readily available in this document or the course website (for example, "When is the first partial exam?"). Requests such as "I need to have my grade fixed on compass" should be addressed to the Head TA. Please do not send emails asking "What kind of problems will you give us in the exam?", "Can you give me an idea as to how many problems we should expect in the exam?", or other questions similar to these; instead, check the sample exams that have been posted on the course web page (or come to lectures, I will usually give some hints on that). Certain questions I cannot possibly answer individually without favoring one student over the rest of the class. For example, "Will the final exam include any problems on torsion?" Had I been willing to provide an answer to this question, I would have made an announcement to the entire class, not just to you by email.

Most of you have impeccable email etiquette, and I am sure all of you want to achieve this lofty status. Therefore, I do not answer emails that do not exhibit proper etiquette. There are numerous websites that address this subject. But in particular at least be sure to:

1. Mind Your Manners: Think of the basic rules you learned growing up, like saying please and thank you. Address people you don't know as Mr., Mrs., or Dr. Only address someone by first name if they imply it's okay to do so.

2. Watch Your Tone: Merriam-Webster defines tone as an "accent or inflection expressive of a mood or emotion." It is very difficult to express tone in writing. You want to come across as respectful, friendly, and approachable. You don't want to sound curt or demanding.

3. Sign your name: End you message with an appropriate closing and include your name.

Academic integrity

Infractions will not be tolerated. See the University's Student Code, Article 1, Part 4.

Outline of the course

Date	Topic	Reading
M 08/27	Introduction and statics review	-
W 08/29	Normal and shear stresses	1.1 - 1.6
F 08/31	Design analysis; Stress on oblique plane	1.7 - 1.13
M 09/03	*Labor Day*	-
W 09/05	Normal strain; Hooke's law; diagrams	2.1 - 2.7
F 09/07	Deformations under axial loading	2.8
M 09/10	Statically indeterminate structures	2.9
W 09/12	Temperature effects	2.10
F 09/14	Lateral strain; Shear strain; Generalized Hooke's law	2.11 - 2.17
M 09/17	Plastic deformation; Residual stress	2.18 - 2.20
W 09/19	Torsion of circular shafts	3.1 - 3.5
F 09/21	Indeterminate shafts	3.6
M 09/24	Design of shafts; Thin-walled torsion members	3.6 - 3.8; 3.13
W 09/26	Beams in bending	4.1 - 4.5; A1 - A5
F 09/28	Beams in bending	4.1 - 4.5; A1 - A5
M 10/01	Non-homogeneous beams; Stress concentration	4.6 - 4.7
W 10/03	Eccentric loading	4.12 - 4.14
F 10/05	Review	-
M 10/08	Review	-
T 10/09	**Hour exam 1 - 7PM - 9PM**	Chapters 1-3
W 10/10	SF and BM diagrams	5.1 - 5.3
F 10/12	SF and BM diagrams	5.1 - 5.3
M 10/15	Design of prismatic beams	5.4
W 10/17	Shear stress in beams	6.1 - 6.3
F 10/19	Shear stress in beams	6.4 - 6.5
M 10/22	Shear stress in thin-walled members	6.6 - 6.7
W 10/24	Transformation of plane stress	7.1 - 7.3
F 10/26	2D Mohr's Circle	7.4
M 10/29	General state of stress; 3D Mohr's circle	7.5 - 7.6
W 10/31	Yield criteria; fracture criteria	7.7 - 7.8
F 11/02	Pressure vessels	7.9
M 11/05	Plane strain	7.10 - 7.12
W 11/07	Review	-
F 11/09	Review	-
M 11/12	Deflection of beams	9.1 - 9.2
T 11/13	**Hour exam 2 - 7PM - 9PM**	Chapters 4-7
W 11/14	Integration methods	9.3 - 9.4
F 11/16	Superposition methods	9.7
M 11/26	Statically indeterminate beams	9.8
W 11/28	Principal stresses in beams	8.1 - 8.2
F 11/30	Stresses under combined loading	8.4
M 12/03	Stresses under combined loading	8.4
W 12/05	Buckling: Euler buckling load	10.1 - 10.3
F 12/07	Buckling: effect of end conditions	10.4
M 12/10	Final Review	-
W 12/12	Final Review	-
M 12/17	8-11am AL2 FINAL EXAM (10am Lecture)	
W 12/19	7-10pm AL1 FINAL EXAM (9am Lecture)	