ME 305
Mechanics of Materials
Section A1, Spring 2010

Course Information

Instructors:

Allan D. Pierce; Lecture: TTh 8–10 am, Pho 205
Office: ENG 401. Phone: (508) 833-0193, 3-4841. adp@bu.edu
Office Hours: ordinarily T 10–12, Th 10–12, F 8-10 or as announced

Ana Medina Ayala, GTF; Recitation section: to be arranged
Office: 15 St. Mary's street, room 224, duvinci@bu.edu

Philipp Maier, grader; philippm@bu.edu

Text:

- Crandall, Dahl, and Lardner, *Introduction to the Mechanics of Solids, second edition with SI units*

- Various handouts posted on the Courseinfo site,

  http://courseinfo.bu.edu/10sprgeng.html

Mechanics of Materials Laboratory:

- 15 St. Mary street, room 308. There will be 4 laboratory exercises, each of roughly three hours duration, occurring at intervals of one to two weeks during the term. Students will participate in groups of between 6 to 10 students, and possible times will be posted by the laboratory teaching staff.

Hardware and Software Requirements:

Access to a scientific calculator
Access to a computer with either *MatLab* or *Octave* installed

Syllabus:

See attached; some topics are not included in the text.

Grading:

Class attendance	25%	Homework	30%
Class attentiveness	5%	Labs	10%
Project	5%	Exams	25%
Ethics	-100%		

- The Laboratory Exercises, with written reports, and the Term Project, with a written report, are *mandatory*. No passing grade will be given unless these are completed.

Course prerequisites:

- high school plane geometry, algebra I and II, trigonometry
- MA 123 (Calculus I), MA 124 (Calculus II), MA 225 (Multivariate Calculus), Py 211 (Physics I), EK 301 (Engineering Mechanics I). Completion of MA 226 (Differential equations) is recommended, but it is sufficient that one be taking it at the same time as the present course.
- It is also recommended that one has completed EK 126 (Engineering Computation), CH 131 (General Chemistry).
- ME 306 (Materials Science) is a highly recommended as something either to take prior to ME 305 or simultaneously with ME 305.

Notes regarding homework and exams

1. Homework with be assigned nominally every week on either Tuesday or Thursday. It will not necessarily be assigned every week.

2. When assigned, the due date will be specified. Late homework will not be accepted.

3. Copies of the homework assignment will ordinarily be posted on the courseinfo site on the day it is assigned. You will be either told in class or notified by e-mail when it is posted.

4. It is expected that you will discuss the problems with your classmates and with the GTF to increase your knowledge of the material. However, everything turned in for credit should be from your own work based on your personal understanding of the material.

5. A perfect problem solution should (a) be legible and well organized, (b) demonstrate a clear and extensible thought process, and (c) be correct. Your work will be evaluated on how nearly it meets this ideal. If a numerical answer is asked, you are expected to give a numerical answer, and to state the units explicitly.

6. Homework should be on 8.5 by 11" paper, with no folding or perforations (three hole punched notebook paper is all right), so that homework can be run through a sheet feeder on a photocopier or scanner if desired. It is all right if you keep your original and hand in a photo copy, and this is actually recommended so that you can have a copy to refer to for future exercises and exams. The instructor may possibly keep a copy of your solutions to refer to when making up the grades at the end of the semester.

7. Number your pages and put your last name and page number in the top left corner on each page.

8. Homework should be neat and legible. Do not crowd the writing and do not write too small. If you can read it, it does not necessarily mean the grader will be able to read it.

9. If your solution to any given problem consists of a sequence of mathematical equations, you should intersperse explanations in writing as to just what you are doing.

10. Use a pencil, unless you never make mistakes. Erase wrong statements, rather than scratching them out.

11. Write on only one side of each piece of paper. (Paper is cheap and it is difficult to look at both sides simultaneously.)

12. Begin each new problem with a fresh piece of paper.

13. Attempt every assigned problem. If you cannot solve any given problem, give a short explanation of why you had difficulties, as this will be helpful to the instructor.

14. Circle your answers, so that the grader will be clear on what you intended to give as your answer.

15. General ethics rules of Boston University apply. It is all right to collaborate or confer with fellow students when doing the homework. However, what you hand in should represent your own thoughts. Verbatim nearly identical solutions from two or more students will be regarded as indicative of cheating.

16. No make-up exams will be given. If you are sick and miss an exam and the instructor is convinced that this was the case then a (possibly minimally penalized) grade will be awarded at the time final grades are decided upon, based on your relative performance in other aspects of the course.

17. If you become ill or have other unforeseen personal problems before the drop date and fall behind on the homework and/or miss four or more classes, it is requested that you drop the course.

18. All quizzes and the final exam will be open book. The questions will be structured so that no electronic equipment will be necessary to determine appropriate answers, and no electronic devices will be allowed on your desktop during the exam.

Week	Date	Lecture Topic	Comments	Reading
1	Thurs 1/14	Stress		4.2, 4.3
2	Mon 1/18	BU holiday	ML King day	
	Tues 1/19	Uniaxial loading, elastic modulus		2.2, 2.3, 5.2
	Thurs 1/21	Trusses, elastic energy		2.4, 2.6, 4.4
3	Tues 1/26	Castigliano, stress components		4.5
	Weds 1/27		Registration ends	
	Thurs 1/28	Shear force, bending moment		3.2, 3.3
4	Tues 2/2	Mohr's circle for stress		4.6, 4.7
	Thurs 2/4	Slender members		3.4, 3.5
5	Tues 2/9			
	Thurs 2/11	Strain tensor, stress-strain relations		4.8, 4.9
6	Mon 2/15	BU Holiday	President's day	
	Tues 2/16	No class	Monday schedule	
	Thurs 2/18	Quiz	Drop without W	
7	Tues 2/23	Beam bending, parallel axis theorem		7.1 – 7.5
	Tues 2/25	Beam stresses, unsymmetrical beams		7.6–7.12
	Thurs 2/26	Differential equations for beams		8.2
8	Tues 3/2	Energy in beams, Castigliano		8.6
	Thurs 3/4	Singularity functions, superposition		8.3, 8.4
9	Tues 3/9	Spring break, no class		
	Thurs 3/11	Spring break, no class		
10	Tues 3/16	Plasticity		5.11, 5.12, 7.9
	Thurs 3/18	Elasticity in cylindrical coordinates		Problems, Chapter 4
11	Tues 3/23	Quiz		
	Thurs 3/25	Thin-walled and thick-walled cylinders		5.7
12	Tues 3/30	Buckling differential equations		9.4
	Thurs 4/1	Buckling loads		
13	Mon 4/5		Last day to drop	
13	Tues 4/6	Torsion of circular cylinders		6.2 – 6.5
	Thurs 4/8	Torsion of hollow shafts		6.6
14	Tues 4/13	Torsion of thin-walled cylinders		6.14
	Thurs 4/15	Combined loading		
15	Mon 4/19	BU holiday	Patriot's day	
	Tues 4/20	Energy concepts		
	Thurs 4/22	No class	Monday schedule	
16	Tues 4/27	Stresses caused by impact		
	Thurs 4/29	Stress concentrations	Last class	
17	Weds 5/5	Final Exam	12:30–2:30	