



Introductory Solid Mechanics

MECH 230 - Fall 2019

3 Credits

Instructor Info —



Masoud Masoumi



Office Hrs: Mon & Thurs 10-11am



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Course Info —



Prereq: ENGS 206



Mondays & Thursdays



3:00-4:15pm



Leo Engineering Bldg 252

Overview

Analysis of stress and strain due to axial, torsional and flexural loads; beams, shafts, columns. Elastic deformation under axial, flexural and torsional loads. Statically determinate and indeterminate problems, principles of superposition and compatibility. Elastic column buckling.

Learning Objectives

- Understanding the following concepts: stress and strain, normal stress and strain, shear stress and strain, and designs of simple connections.
- Calculating stress, strain, and deformations for axial loading, torsion, pure bending, and transverse loading of beams.
- Solving statically indeterminate problems.
- Calculating principle stress.
- Designing beams for strength.

Material

Required Text

Ferdinand P. Beer, J. E. Russell Johnston, John T. DeWolf, and David F. Mazurek, *Mechanics of Materials*, McGraw-Hill, 7th edition (2014)

Complementary Texts

Russell C. Hibbeler, *Mechanics of Materials*, Pearson, 10th edition (2017)

Timothy A. Philpot, Jeffery S. Thomas, *Mechanics of Materials: An Integrated Learning System*, 4th Edition, (2018)

Jacob Lubliner and Panayiotis Papadopoulos, *Introduction to Solid Mechanics*, Springer-Verlag New York, 2nd edition (2016)

Other

Any handouts, required journal articles and book chapters will be provided.

Grading Scheme

20%	Quizzes	A	Grade \geq 93%
		A ⁻	90% \leq Grade < 93%
		B ⁺	87% \leq Grade < 90%
50%	2 Midterm Exams (25% each)	B	83% \leq Grade < 87%
		B ⁻	80% \leq Grade < 83%
		C ⁺	77% \leq Grade < 80%
30%	Final Exam	C	73% \leq Grade < 77%
		C ⁻	70% \leq Grade < 73%
		D ⁺	65% \leq Grade < 70%
5%	Project (Extra Credit)	D	60% \leq Grade < 65%
		F	Grade < 60%

ABET Outcomes

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

Homework

Homework will be assigned after the completion of each topic. All problem assignments will be due the following week unless another date is specified. Completed assignments will be collected at the beginning of class and late work will not be accepted. Please do not email your late homework assignments to the instructor.

FAQs

? What if my schedule does not allow me to attend office hours?

! You are more than welcome to make an appointment whenever you have a question or concern by contacting me via email.

? What is the topic for project?

! The project is optional. The details for the project will be announced after the second midterm. As a general guideline, you will have to use both analytical skills and computer programming skills for the project. The programming language is your choice, however, MATLAB is recommended.

? Is there any online resource that you suggest for this course?

! There are so many references and materials available for mechanics of materials. However, a recommended resource is <https://web.mst.edu/~mdsolids/index.html>. You can install the software package and start watching the videos, look into different types of problems, and run simple computations.

? What is your advice for performing well in this course?

! Be an active listener, take good notes, and read all assigned materials. Don't just read the solutions to the problems and examples, solve them! Be organized and manage your time appropriately.

- Submitted assignments should be clean, clear, and well organized.
- Please include Free-Body-Diagrams, indicating all the forces, moments, directions, components, etc.
- Solutions should contain all steps leading to the final answer.
- Final answers must be underlined, circled, highlighted, or in some way distinguished from the problem.

Class Policy & Attendance

Due to the nature of the materials covered in this course, regular attendance is highly recommended. Students are required to fulfill all course requirements as detailed in the course syllabi for their registered courses. Implicit in these requirements is completion of all course assignments and attendance in all classes. Also, if I believe that a student's failure to attend class is substantially affecting his/her course grade, I am obligated to report the situation to the dean of the school in which the student is matriculated. The dean will address the situation with the student. In case you miss a class, it is your responsibility to keep up with the class work and be informed of all announcements in class such as homework assignments, quizzes, etc. Cell phones and all other forms of electronic communication devices, if carried into the classroom, must be turned off. The use of computers and other electronic devices during class is restricted to classroom activities and course applications.

Diversity and Inclusivity

I consider this classroom to be a place where you will be treated with respect, and I welcome individuals of all ages, backgrounds, beliefs, ethnicities, gender identities, national origins, religious affiliations, sexual orientations, ability, and other visible and non-visible differences. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class.

Accommodations for Students with Special Needs

If you are a student with learning needs that require special accommodation, contact the Accommodation Administrator in Specialized Resource Center (SRC) located in Thomas Hall, Room 3.15 as soon as possible to make an appointment to discuss your special needs. Once your Academic Adjustment/ Auxiliary Form is approved, please meet with me during my office hours and bring the form. You can find more information about SRC and the procedure on their website <https://inside.manhattan.edu/academic-resources/specialized-resource-center/index.php>.

Academic Assistance

The Center for Academic Success (CAS) has two locations - the Learning Commons & the Leo Learning Center. These offices, conveniently spread across campus, will provide students with a quiet space to study with a peer tutor, or engage in small group study sessions. The services offered include individual peer tutoring in most 100-200 level and select 300-600 level courses. All services are free of charge. Appointments are preferred but drop-ins are also welcome. To make an appointment contact the CAS at (718) 862-7414, email success@manhattan.edu or visit Thomas Hall, 3rd floor. For more information please visit their website at <https://inside.manhattan.edu/academic-resources/center-for-academic-success/index.php>

Class Schedule

The course will tentatively follow this schedule :

Week	Topic	Textbook Reading
Week 1	Introduction, Fundamental Concepts of Stress	1.1-1.5
Week 2 ⁺	Fundamental Concepts of Stress	1.1-1.5
Week 3 ^Q	Axial Loading	2.1-2.5
Week 4	Axial Loading Stress Concentration	2.7-2.8 & 2.10 2.11
Week 5 ^Q	Torsion	3.1-3.5
Week 6	Pure Bending	4.1-4.3
Week 7	Midterm Exam I (October 7 th)	
Week 8 ^Q	Composite Materials	4.4
Week 9	Analysis and Design of Beams for Bending	5.1-5.4
Week 10 ^Q	Shearing Stress	6.1-6.4
Week 11	Midterm Exam II (November 7 th)	
Week 12	Transformation of Stress and Strain Pressure Vessels	7.1-7.4 7.6
Week 13 ^Q	Combined Loadings	8.1-8.3
Week 14 ^x	Deflection of Beams	9.1-9.4
Week 15 ^Q	Column Analysis*	10.1-10.4
Week 16	Final Exam	

⁺ Monday, September 2nd is Labor Day and there is no class.

^x Thursday, November 28th is Thanksgiving Day and there is no class.

^Q Quizzes will be on Thursdays at the beginning of the class.

* We will cover these topics only if time permits.