

COE 3001 B – Mechanics of Deformable Bodies – Fall 2022

Meeting Times: Mondays and Wednesdays 11am-12.15pm
Classroom: Mason 2117
Office hours: Tuesdays and Wednesdays 4pm-5pm via Zoom:
<https://gatech.zoom.us/j/95100845654>
 To meet students' requirements, needs, and comfort levels, office hours will be offered in-person upon request. To schedule in-person office hours, please send an email to Dr. Arson <chloe.arson@ce.gatech.edu>.
Grader: Meron Belachew <mbelachew3@gatech.edu>

Prerequisites: COE 2001 (Statics) and MATH 2403, 2413, 24X3, 2552, 2562 or 2X52.
Textbook: *Mechanics of Materials*, 8th edition, J.M. Gere & B.J. Goodno, 2013, CENGAGE Learning, ISBN-13:9781111577735
Note: You can use other editions of the book for most of the contents of the course, but please keep in mind that reading assignments are designated by sections of the 8th edition.

Learning Objectives:

1. Develop an ability to visualize and understand the fundamental behavior of structures and solids
2. Develop an understanding of assumptions and idealizations commonly used for analysis of structures and solids
3. Learn methods of computing stresses in several types of structural and machine components
4. Learn the fundamental approach for determining internal forces and stresses in indeterminate structures: use of equations of equilibrium, force-temperature-deformation relations, and expressions for the geometry of the deformations
5. Develop a basic knowledge of approaches to design of structural and machine components

Outline & Schedule:

Note that the schedule of topics may have to be updated during the semester. Chapter and section numbers indicated in the table below refer to the 8th edition of the textbook. Reading is not graded, but it is strongly recommended to read the book according to the schedule indicated to be successful in this course.

Week	Lecture	Date	Topics	To Read Before Class
1	1	08/22	Review: problem solving, statics.	Appendices B, C and I
	2	08/24	Stress & Strain: normal stress and strain, stress-strain diagrams, Hooke's law.	
2		08/29	Stress & Strain: lateral strains and Poisson's ratio, plasticity, creep, shear stress and strain, bearing stress	1.1-8
	3	08/31		
3	4	09/05	<i>Labor Day – No class</i>	
	5	09/07	Axial Deformation: deformation of axially loaded members, statically indeterminate structures, thermal deformation, strain energy.	2.1-7
4	6	09/12		
	7	09/14		
5	8	09/19	Torsion: torsion of circular bars, power transmission in circular shafts, statically indeterminate problems.	12.6 + 3.1-8
	9	09/21		
6	10	09/26	Stresses in Beams (1/3): shear force and bending moment diagrams, properties of sections (statics review).	12.1-9
	11	09/28	Exam 1	

Week	Lecture	Date	Topics	To Read Before Class
7	12	10/03	Stresses in Beams (2/3): normal stress due to pure bending, shear stress in beams of rectangular section, shear stress in beams of non-rectangular section, design of beams for bending stresses.	4.1-5, 5.1-6, 5.8-10
	13	10/05		
8	14	10/10		
	15	10/12		
9		10/17	<i>Fall Break – No class</i>	
	16	10/19	Stresses in Beams (3/3): shear flow and built-up beams, stresses in beams under general loading conditions, composite beams, transformed section method. <i>If time allows: steel-reinforced concrete beams.</i>	5.11-12 6.1-4
10	17	10/24		
	18	10/26		
11	19	10/31	<i>If time allows: steel-reinforced concrete beams.</i>	
	20	11/02	Exam 2	
12	21	11/07	Stress and Strain Transformation at a Point: transformation of stress in plane stress, principal stresses, maximum shear stress, Mohr’s circle, principal strains, maximum shear strain, membrane stresses, pressure vessels and pipes.	7.1-7, 8.1-4
	22	11/09		
13	23	11/14		
	24	11/16		
14	25	11/21	Beam Deflection (1/2): curvature, beam deflection equation, statically determinate beams, superposition method	9.1-5
		11/23	<i>Thanksgiving Holiday – No Class</i>	
15	26	11/28	Beam Deflection (2/2): statically indeterminate beams, superposition method.	10.1-4
	27	11/30	Column Buckling: energy and equilibrium, buckling of columns with different boundary conditions.	11.1-6
16	28	12/05		
Final Exam: Friday December 9, 11.20am – 2.10pm (usual classroom)				

*Blue font: instructor at conference or on jury duty – details will be provide later on substitution

Grading: Final grade: $F < 60\% \leq D < 70\% \leq C < 80\% \leq B < 90\% \leq A \leq 100\%$

Score: Exams: 25% each = 75%. Homework 1-10: 2% each = 20%. Quizzes: 1% each (best) = 5%.

Exams: Exam dates are indicated in the schedule above. All students must take the three exams to pass the course. Exam syllabi will be posted later during the semester, at least one week prior to the exam. Exam 1 will cover the first five weeks of the semester, exam 2 will focus on weeks 6-11, and the final exam will be cumulative, with emphasis on the material covered during weeks 12-16. Examinations will be held in person unless otherwise stated. If examinations have to be handled remotely for public health reasons, we will use *Honorlock* for proctoring and submission. The exam will be posted on the course website, and you will have a limited amount of time to submit your paper through *Canvas*. During the exam, you will have to be logged in *Canvas Honorlock*.

Homework: Homework format requirements and due dates are indicated in the “Homework Syllabus”, which will be updated regularly during the semester with the list of problems assigned. Homework will have to be **submitted online by the due date**, through *Canvas* “Assignments” function. Students needing extra-time must ask permission from the instructor to submit late, **before** the deadline. **All late homework will be given half credit, even with permission to submit late.** Extra time will never exceed one week. No credit will be given for homework submitted more than one week after the deadline or to homework submitted late without permission. Homework solutions will (usually) not be discussed in class but questions can be asked during office hours.

Quizzes: Five to ten pop-up online quizzes will be given during the semester. You will have to submit your answers through *Canvas* “Quizzes” function. You will typically have a week to complete quizzes and you will be given 10 attempts. Quizzes will comprise True/False questions, multiple choice questions and short problems that require a unique numerical answer. Only the five best quiz grades will be counted in the course grade.

Surveys and participation: Surveys will be used regularly to adapt the pace of the lectures to students’ needs. Students’ engagement and feedback are essential to ensure the success of these activities. Participation to these surveys will not be graded but, together with the grades obtained at homeworks and quizzes, survey participation will be seen favorably when determining the final score of students who are border-line between two course grades.

Class ground rules:

- Attendance and punctuality at all lectures are expected. Missing a class is not an excuse not to submit homework.
- By respect to the other students in the class as well as the learning environment in general, it is expected that students will not spend the lecture time on their electronic devices (laptop, tablet, smart phone) for any other purpose than studying for the course. In general, it is expected that students coming to class will engage in the course and will not spend the lecture time working on another course or focus on any activity other than the learning exercises proposed for COE 3001 Mechanics of Deformable Bodies.
- Office hours will be held to answer specific questions. Office hours are not meant to assist students to catch up with lectures that they missed or to recap on a whole chapter. It is the students’ responsibility to study the material posted online before coming to office hours in order to ask specific questions, e.g., on a problem or on an example seen in class.
- Students are strongly encouraged to communicate through electronic platforms like *Piazza* to collaborate on homework. But note that homework papers are individual: a plagiarism check software will be used for every assignment.
- Exams are also strictly individual. Exams will be similar to assigned homework and/or problems solved in class. Extra problems will be recommended at the end of each lecture to help prepare for exams.

Academic Integrity: Working in group on homework is allowed (and encouraged). However, each student must write up and turn in their own solutions. In-class exams are strictly individual. Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment, will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Georgia Tech's Academic Honor Code, please visit <http://www.catalog.gatech.edu/policies/honor-code/> or <http://www.catalog.gatech.edu/rules/18/>.

Recordings of Class Sessions and Required Permissions: Classes may not be recorded by students without the express consent of the instructor unless it is pursuant to an accommodation granted by the Office of Disability services. Class recordings, lectures, presentations, and other materials posted on Canvas are for the sole purpose of educating the students currently enrolled in the course. Students may not record or share the materials or recordings unless the instructor gives permission.

Dean of Students Office, CARE Center, Counseling Center, Stamps Health Services, and the Student Center: The [CARE Center](#) and the [Counseling Center](#), Stamps Health Services, and the Dean of Students Office will offer both in-person and virtual appointments. Student Center services and operations are available on the [Student Center](#) website. For more information on these and other student services, contact the Dean of Students or the [Division of Student Life](#).

Information Related to Covid-19: Students are expected to be familiar with and abide by the Institute guidelines, information, and updates related to Covid-19. Find campus operational updates, Frequently Asked Questions, and details on campus surveillance testing and vaccine appointments on the [Tech Moving Forward site](#).

Accommodations for Students with Disabilities: If you are a student with learning needs that require special accommodation, please contact the Office of Disability Services at (404)894-2563 or <http://disabilityservices.gatech.edu/>, as soon as possible, to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Diversity Statement: 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, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability – and other visible and nonvisible differences. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class.

Safe Zone Statement: I am a member of a Safe Zone Ally community network, and I am available to listen and support you in a safe and confidential manner. As a Safe Zone Ally, I can help you connect with resources on campus to address problems you may face that interfere with your academic and social success on campus as it relates to issues surrounding sexual orientation and gender identity. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. My goal is to help you be successful and to maintain a safe and equitable campus.