MECH 3301-501
Mechanics of Materials

Spring 2013

Instructor: Prof. X.-L. Gao
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Classroom: ECSN 2.110 **Time**: TR 5:30-6:45PM

Prerequisites: MECH 2320 (Strength of Materials)

Co-requisites: ENGR 3300 (Advanced Engineering Mathematics), ENGR 3341 (Probability Theory and Statistics)

TA/Grader: Mr. Yong He **Office:** ECSS3.619 **E-mail:** yxh120330@utdallas.edu

Office Hours: TR 2:30am-3:30pm (Dr. Gao's office); MW 2:00-3:00pm (TA's office)

Textbook

- R. D. Cook and W. C. Young, *Advanced Mechanics of Materials*, 2nd edition, Prentice-Hall, Upper Saddle River, NJ, 1999

Reference Books

- A. P. Boresi, R. J. Schmidt and O. M. Sidebottom, *Advanced Mechanics of Materials*, 6th edition, Wiley, New York, 2003
- A. C. Ugural and S. K. Fenster, *Advanced Strength and Applied Elasticity*, 4th edition, Prentice-Hall, Upper Saddle River, NJ, 2003
- R. Solecki and R. J. Conant, *Advanced Mechanics of Materials*, Oxford University Press, Oxford, 2003

Grading

- Your letter grade for this course will be determined based upon grades from homework assignments and three exams, with

Homework	25%
Exams (3×25%)	75%

A: ≥ 90; **B**: ≥ 80; **C**: ≥ 70; **D**: ≥ 60: **F**: < 60

Course Objectives

- To learn to derive approximate solutions of engineering mechanics problems by using suitable assumptions

- To understand the nature of the approximations and their effects on the accuracy of the resulting mechanics-of-materials solutions
- To apply the principles of advanced mechanics of materials to analyze deformation and failure problems common in engineering design and materials science
- To get prepared for success in more advanced mechanics courses such as elasticity, energy methods, finite element analysis, continuum mechanics, and plasticity

Syllabus*

Week	Topics	Reading	HW Problems
1	Review of Mechanics of Materials	Chapt. 1	1.4-1, 5-1, 8-6
(1/14/13)	Stress, Constitutive Relations	2.1, 2.5	2.5-1, 3
	Principal Stresses	2.2-3	2.3-1, 2(b), 5
2	Octahedral Shear Stress	2.4	2.4-1
(1/21/13)	Strain Energy, Stress Concentration	2.6-7	2.6-1
	Brittle and Ductile Failure	3.1-3	3.2-4, 3.3-2, 3, 11
3	Basics of Fracture Mechanics	3.5	3.5-2, 6, 8
(1/28/13)	Introduction to Fatigue	3.6	3.6-2, 4, 8
4	Concepts of Elasticity, Strain	7.1-2	7.1-1, 7.2-2, 3
(2/4/13)	Equilibrium and Boundary Conditions	7.3	7.3-1, 3, 4, 6
	Airy's Stress Function, Inverse Method	7.4-6	7.4-4, 5, 7.5-3, 7.6-2
5	Problems in Polar Coordinates	7.7-8	7.7-5, 7, 7.8-3
(2/11/13)	Thick-walled Pressure Vessels	8.1-2	8.2-1, 5, 6
	Exam # 1		
6	Beams on an Elastic Foundation	5.1-2	5.2-2, 4, 5
(2/18/13)	Energy Method - Concepts	4.1-2	4.1-2, 7, 4.2-2, 5
	Complementary Energy, Unit Load Method	4.3-4	4.5-3, 5, 6
7	Castigliano's 2nd Theorem, Examples	4.4-6	4.6-3, 5, 11
(2/25/13)	Statically Indeterminate Problems	4.7	4.7-3, 11, 16
8	Potential Energy, Stationary Principle	4.9-10	4.10-2, 3
(3/4/13)	St. Venant Torsion Theory	9.1, 7.11	7.11-1, 2
	Prandtl Stress Function	7.12	7.12-3, 4
	No Classes (Spring Break)		
9	Membrane Analogy	9.2-3	9.2-1, 9.3-1, 5
(3/18/13)	Thin-walled Sections	9.5-6	9.5-3, 5, 9.6-5(a)
	Unsymmetric Bending	10.1	10.1-1, 2
10	Stress in Beams: Examples	10.2	10.2-1, 6, 8
(3/25/13)	Deflections in Bending	10.3	10.3-1, 4, 8
	Exam # 2		
11	Shear in Bending	10.4	10.4-3, 4, 5
(4/1/13)	Shear Center	10.5-8	10.5-1, 10.6-1(*l*), 10.8-1
12	Curved Beams	6.1-2	6.1-1, 6.2-4, 6
(4/8/13)	Circumferential Stress: Examples	6.2-3	6.2-2, 6.3-1, 7
	Radial and Shear Stresses	6.4	6.4-2, 9, 10
13	Plate Bending	12.1-2	12.2-1, 2, 3
(4/15/13)	Uniform Bending, Boundary Conditions	12.2-3	12.3-1, 2
14	Axisymmetric Plates	12.5	12.5-1, 2
(4/22/13)	Solutions of Simple Axisymmetric Problems	12.6-8	12.6-1, 7-1, 8-1
15	Column Buckling	14.1	14.1-1, 3, 4
(4/29/13)	Energy Method in Bucking Analysis	14.2	14.2-2, 5, 6
	Exam # 3: 5/9/2013, Thursday, 5:00-7:45am (to be verified)		

*** The topics and assignments are tentative and subject to change.**

Other Relevant Information

- Solving problems is essential in learning the course materials.
- Attendance is expected and will be checked.
- Assignments are due at the beginning of Tuesday's class in the following week.
- The instructor is available for additional help with appointments.
- Help and review sessions will be held when needed.

Student Conduct & Discipline

The University of Texas System and The University of Texas at Dallas (UTD) have rules and regulations for the orderly and efficient conduct of their business. It is the responsibility of each student and each student organization to be knowledgeable about the rules and regulations which govern student conduct and activities. General information on student conduct and discipline is contained in the UTD printed publication, *A to Z Guide*, which is provided to all registered students each academic year.

The University of Texas at Dallas administers student discipline within the procedures of recognized and established due process. Procedures are defined and described in the *Rules and Regulations, Series 50000, Board of Regents, The University of Texas System,* and in Tit le V, Rules on Student Services and Activities of the university's *Handbook of Operating Procedures*. Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations (SU 1.602, 972/883-6391) and online at http://www.utdallas.edu/judicialaffairs/UTDJudicialAffairs -HOPV.html

A student at the university neither loses the rights nor escapes the responsibilities of citizenship. He or she is expected to obey federal, state, and local laws as well as the Regents' Rules, university regulations, and administrative rules. Students are subject to discipline for violating the standards of conduct whether such conduct takes place on or off campus, or whether civil or criminal penalties are also imposed for such conduct.

Academic Integrity

The faculty expects from its students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student for that degree, it is imperative that a student demonstrate a high standard of individual honor in his or her scholastic work.

Scholastic Dishonesty, any student who commits an act of scholastic dishonesty is subject to discipline. Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.

Plagiarism, especially from the web, from portions of papers for other classes, and from any other source is unacceptable and will be dealt with under the university's policy on plagiarism (see general catalog for details). This course will use the resources of turnitin.com, which searches the web for possible plagiarism and is over 90% effective.

Cheating on exams will not be tolerated. Cheating will be reported and handled in accordance with the UTD regulations/rules. Some or all examinations will be closed book; "looking at another student's examination or using external aids (for example, books, notes, calculators, conversation with others, or electronic devices)" during these examinations is an act of scholastic dishonesty, unless specifically allowed in advance by the instructor.

Unless specifically allowed in advance by the instructor, all assignments and homework in this class are expected to be completed based on individual effort. Copying the work of others, including homework, is a violation of the UTD rule for academic honesty.

Copyright Notice

The copyright law of the United States (Title 17, United States Code) governs the making of photocopies or other reproductions of copyrighted materials, including music and software. Copying, displaying, reproducing, or distributing copyrighted works may infringe the copyright owner's rights and such infringement is subject to appropriate disciplinary action as well as criminal penalties provided by federal law. Usage of such material is only appropriate when that usage constitutes "fair use" under the Copyright Act. As a UT Dallas student, you are required to follow the institution's copyright policy (Policy Memorandum 84-I.3-46). For more information about the fair use exemption, see http://www.utsystem.edu/ogc/intellectualproperty/copypol2.htm

The handouts used in this course are copyrighted. By "handouts," it means all materials generated for this class, which include but at not limited to syllabi, notes, homework assignments, quizzes, exams, in-class materials, review sheets, additional problem sets, and all solutions to these assignments. Because these materials are copyrighted, you do not have the right to copy the handouts unless permission is expressly granted.

E-mail Use

The University of Texas at Dallas recognizes the value and efficiency of communication between faculty/staff and students through electronic mail. At the same time, e-mail raises some issues concerning security and the identity of each individual in an e-mail exchange. The university encourages that all official student e-mail correspondence will be sent only to a student's UTD e-mail address and that faculty and staff will consider e-mail from students official only if it originates from a UTD student account. This allows the university to maintain a high degree of confidence in the identity of all individual corresponding and the security of the transmitted information. UTD furnishes each student with a free e-mail account that is to be used in all communication with university personnel. The Department of Information Resources at UTD provides a method for students to have their UTD e-mails forwarded to other accounts.

Withdrawal from Class

The administration of this institution has set deadlines for withdrawal of any college-level courses. These dates and times are published in that semester's course catalog. Administration procedures must be followed. It is the student's responsibility to handle withdrawal requirements from any class. In other words, the instructor cannot drop or withdraw any student. You must do the proper paperwork to ensure that you will not receive a final grade of "F" in a course if you choose not to attend the class once you are enrolled.

Student Grievance Procedures

Procedures for student grievances are found in Title V, Rules on Student Services and Activities, of the university's *Handbook of Operating Procedures*.

In attempting to resolve any student grievance regarding grades, evaluations, or other fulfillments of academic responsibility, it is the obligation of the student first to make a serious effort to resolve the matter with the instructor, supervisor, administrator, or committee with whom the grievance originates (hereafter called "the respondent"). Individual faculty members retain primary responsibility for assigning grades and evaluations. If the matter cannot be resolved at that level, the grievance must be submitted in writing to the respondent with a copy of the respondent's School Dean. If the matter is not resolved by the written response provided by the respondent, the student may submit a written appeal to the School Dean. If the grievance is not resolved by the School Dean's decision, the student may make a written appeal to the Dean of Graduate or Undergraduate Education, and the deal will appoint and convene an Academic Appeals Panel. The decision of the Academic Appeals Panel is final. The results of the academic appeals process will be distributed to all involved parties.

Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations.

Incomplete Grade Policy

As per university policy, incomplete grades will be granted only for work unavoidably missed at the semester's end and only if 70% of the course work has been completed. An incomplete grade must be resolved within eight (8) weeks from the first day of the subsequent long semester. If the required work to complete the course and to remove the incomplete grade is not submitted by the specified deadline, the incomplete grade is changed automatically to a grade of **F**.

Disability Services

The goal of Disability Services is to provide students with disabilities equal educational opportunities. Disability Services provides students with a documented letter to present to

the faculty members to verify that the student has a disability and needs accommodations. This letter should be presented to the instructor in each course at the beginning of the semester and accommodations needed should be discussed at that time. It is the student's responsibility to notify his or her professors of the need for accommodation. If accommodations are granted for testing accommodations, the student should remind the instructor five days before the exam of any testing accommodations that will be needed. Disability Services is located in Room 1.610 in the Student Union. Office hours are Monday – Thursday, 8:30 a.m. to 6:30 p.m., and Friday 8:30 a.m. to 5:00 p.m. You may reach Disability Services at (972) 883-2098.

Guidelines for documentation are located on the Disability Services website at http://www.utdallas.edu/disability/documentation/index.html

Religious Holy Days

The University of Texas at Dallas will excuse a student from class or other required activities for the travel to and observance of a religious holy day for a religion whose places of worship are exempt from property tax under Section 11.20, Tax Code, Texas Code Annotated.

The student is encouraged to notify the instructor or activity sponsor as soon as possible regarding the absence, preferably in advance of the assignment. The student, so excused, will be allowed to take the exam or complete the assignment within a reasonable time after the absence: a period equal to the length of the absence, up to a maximum of one week. A student who notifies the instructor and completes any missed exam or assignment may not be penalized for the absence. A student who fails to complete the exam or assignment within the prescribed period may receive a failing grade for that exam or assignment.

If a student or an instructor disagrees about the nature of the absence [i.e., for the purpose of observing a religious holy day] or if there is similar disagreement about whether the student has been given a reasonable time to complete any missed assignments or examinations, either the student or the instructor may request a ruling from the chief executive officer of the institution, or his or her designee. The chief executive officer or designee must take into account the legislative intent of TEC 51.911(b), and the student and instructor will abide by the decision of the chief executive officer or designee.

These descriptions and timelines are subject to change at the discretion of the Professor.