

MAE 2312-001: Solid Mechanics

Fall 2015

Instructor: Dr. Erian Armanios

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Office Hours: 1:30 pm - 2:30 pm; M W

Section Information: MAE 2312-001

Time and Place of Class Meetings: Room 210, Woolf Hall (WH) MWF 11:00 – 11:50 am

Course Website: <https://elearn.uta.edu/> (blackboard)

Teaching Assistant: Mr. Bastiaan van der Vossen

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Office Hours: 9:00 am – 10:00 am T Th; 1:00 pm – 2:00 pm F

Description of Course Content: This course covers the relationships between stresses and strains in elastic bodies and the tension, compression, shear, bending, torsion, and combined loadings which produce them. It also covers the deflections and elastic curves, shear and bending moment diagrams for beams, and column theory.

Student Learning Outcomes: The course is intended to provide students with a clear and thorough presentation of both the theory and application of the fundamental principles of mechanics of materials for mechanical design. Students will develop an understanding of the meaning of stress and strain, and the relation between them. They will learn how to analyze the distribution of internal loads, deformation, stresses and strains in structural elements (e.g. bars, beams) due to application of external loading. They will also learn the basic concepts and analysis techniques of structural stability emphasizing the buckling of columns.

Course Prerequisites: MAE 1312 Engineering Statics

Required Textbooks and Other Course Materials:

J.M. Gere and B.J. Goodno, Mechanics of Materials, 8th Edition, Cengage Learning, 2013.

The text book will be used as reference, and for some reading and homework assignments.

Course Content: The topics listed below will be covered during this course.

1. Stress and Strain
2. Mechanical Properties of Materials
3. Axial Load
4. Torsion
5. Bending
6. Transverse Shear
7. Combined Loading
8. Stress and Strain Transformation
9. Analysis of Beams and Shafts
10. Beam Deflection
11. Buckling of Columns

Descriptions of major assignments and examinations:

There will be 10-12 homework assignments, two midterm exams and one final exam.

1st Midterm: Monday, September 28, 2015, 11:00 am – 11:50 am.

Syllabus: All class materials, solved problems, homework and reading assignments that are covered to date.

2nd Midterm: Monday, November 2, 2015, 11:00 am – 11:50 am.

Syllabus: All class materials, solved problems, homework and reading assignments that are covered between 1st midterm and to date.

Homework: Assigned weekly during class and due at the beginning of class one week later.

Final Exam: Wednesday, December 16, 2015, 11 am – 1:30 pm. On the date scheduled by the University during the Final Exam Period. Covers all class materials including homework, solved problems, reading assignments and midterm exams.

Labor Day Holiday: September 7, 2015.

Thanksgiving Holidays: November 26 – 27, 2015.

Last day to drop class: November 4, 2015.

Last day of class: December 9, 2015.

Note on Assignments and Exams:

Reading: You are expected to read the assigned sections in your textbook and encouraged to check other sections and references. Learning is the ultimate goal.

Homework: The work you turn in is a product, with your name on it. It must represent your very best effort. I expect you to complete it on time, because you will plan your effort accordingly.

Work as many problems as possible, especially those marked with an asterisk (*). Each problem is an application of the principles presented in class and provides training on how to apply them. As you work these problems you will also appreciate the underlying assumptions and applicability of these principles.

All work submitted must be done by you, and any help you get from your study group must be acknowledged. Refer to the University Academic Integrity conduct when in doubt.

Homework turned in late will receive a 5% penalty per day until solution for that Homework is posted.

No late home work will be accepted after the solution is made available to students.

Exams: Are one means to evaluate your understanding not to punish you for your mistakes. UTA regulations permitting, missed midterms and/or final exams can only be rescheduled when missed due to major health problems or circumstances beyond the student's control. With instructor's discretion, students will be required to reschedule the missed exams at the earliest time possible.

Attendance Policy: At The University of Texas at Arlington, taking attendance is not required. Rather, each faculty member is free to develop his or her own methods of evaluating students' academic performance, which includes establishing course-specific policies on attendance. As the instructor of this section, I strongly recommend to attend each class.

Course Grading Policy:

| | |
|-------------------------|-----|
| 1 st Midterm | 100 |
| 2 nd Midterm | 100 |
| Homework | 40 |
| Final Exam | 160 |

| | |
|-----------------------|-----|
| Semester Total points | 400 |
|-----------------------|-----|

| Grading Scale | Letter Grade |
|---------------|--------------|
| 340 or above | A |
| 300 – 339 | B |
| 260 – 299 | C |
| 220 – 259 | D |
| 000 – 220 | F |

Students are expected to keep track of their performance throughout the semester and seek guidance from available sources (including the instructor) if their performance drops below satisfactory levels; see “Student Support Services,” below.

Drop Policy: Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance.** Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (<http://www.uta.edu/aao/fao/>).

Disability Accommodations: UT Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including *The Americans with Disabilities Act (ADA)*, *The Americans with Disabilities Amendments Act (ADAAA)*, and *Section 504 of the Rehabilitation Act*. All instructors at UT Arlington are required by law to provide “reasonable accommodations” to students with disabilities, so as not to discriminate on the basis of disability. Students are responsible for providing the instructor with official notification in the form of a letter certified by the **Office for Students with Disabilities (OSD)**. Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting: **The Office for Students with Disabilities, (OSD)** www.uta.edu/disability or calling 817-272-3364. **Counseling and Psychological Services, (CAPS)** www.uta.edu/caps/ or calling 817-272-3671.

Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability or by calling the Office for Students with Disabilities at (817) 272-3364.

Title IX: *The University of Texas at Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disabilities, genetic information, and/or veteran status in its educational programs or activities it operates. For more information, visit uta.edu/eos. For information regarding Title IX, visit www.uta.edu/titleIX.*

Academic Integrity: Students enrolled all UT Arlington courses are expected to adhere to the UT Arlington Honor Code:

I pledge, on my honor, to uphold UT Arlington’s tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.

I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.

UT Arlington faculty members may employ the Honor Code as they see fit in their courses, including (but not limited to) having students acknowledge the honor code as part of an examination or requiring

students to incorporate the honor code into any work submitted. Per UT System *Regents' Rule* 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University.

Electronic Communication: UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at <http://www.uta.edu/oit/cs/email/mavmail.php>.

Student Feedback Survey: At the end of each term, students enrolled in classes categorized as "lecture," "seminar," or "laboratory" shall be directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit <http://www.uta.edu/sfs>.

Final Review Week: A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

Emergency Exit Procedures: Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit, which are located at either end of the hallway. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist handicapped individuals. Any handicapped person not able to evacuate themselves shall go to the stairway and wait for rescue personnel to take them downstairs.

Student Support Services: UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at <http://www.uta.edu/universitycollege/resources/index.php>.

Course Schedule

Week 1

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|--------|--|-----------|--|--------|----------------|
| Monday | | Wednesday | | Friday | |
| | | | | Aug 28 | Intro/Syllabus |

Week 2

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|--------|------|-----------|------|--------|------|
| Monday | | Wednesday | | Friday | |
| Aug 31 | Ch 1 | Sept 2 | Ch 1 | Sept 4 | Ch 1 |

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|-------------------|-------------------------|----------------------|--------|-------------------|------------------|
| Week 3 | | | | | |
| Monday Sept 7 | Labor Day | Wednesday Sept 9 | Ch 2 | Friday Sept 11 | Ch 2 |
| Week 3 | | | | | |
| Monday Sept 14 | Ch 2 | Wednesday Sept 16 | Ch 2 | Friday Sept 18 | Ch 2; start Ch 3 |
| Week 4 | | | | | |
| Monday Sept 21 | Ch 3 | Wednesday Sept 23 | Ch 3 | Friday Sept 25 | Ch 3;MT Review |
| Week 5 | | | | | |
| Monday Sept 28 | 1 st Midterm | Wednesday Sept 30 | Ch 3 | Friday Oct 2 | Ch 3 |
| Week 6 | | | | | |
| Monday Oct 5 | Ch 4 | Wednesday Oct 7 | Ch 4 | Friday Oct 9 | Ch 4 |
| Week 7 | | | | | |
| Monday Oct 12 | Ch 5 | Wednesday Oct 14 | Ch 5 | Friday Oct 16 | Ch 5 |
| Week 8 | | | | | |
| Monday Oct 19 | Ch 5 | Wednesday Oct 21 | Ch 5 | Friday Oct 23 | Ch 5 |
| Week 9 | | | | | |
| Monday Oct 26 | Ch 7 | Wednesday Oct 28 | Ch 7 | Friday Oct 30 | Ch 7 |
| Week 10 | | | | | |
| Monday Nov 2 | 2 nd Midterm | Wednesday Nov 4 | Ch 7 | Friday Nov 6 | Ch 7 |
| Week 11 | | | | | |
| Monday Nov 9 | Ch 7 | Wednesday Nov 11 | Ch 8 | Friday Nov 13 | Ch 8 |
| Week 12 | | | | | |
| Monday Nov 16 | Ch 8 | Wednesday Nov 18 | Ch 9 | Friday Nov 20 | Ch 9 |
| Week 13 | | | | | |
| Monday Nov 23 | Ch 9 | Wednesday Nov 25 | Ch 9 | Friday Nov 27 | Thanksgiving |
| Week 14 | | | | | |
| Monday Nov 30 | Buffer | Wednesday Dec 2 | Buffer | Friday Dec 4 | Ch 11 |

Week 15

| | | | | | |
|-----------------|-------|--------------------|--------|------------------|------------|
| Monday Dec 7 | Ch 11 | Wednesday Dec 9 | Review | Friday Dec 11 | *No class* |
|-----------------|-------|--------------------|--------|------------------|------------|

Week 16

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|------------------|------------|---------------------|-------------------------------|
| Monday Dec 14 | *No class* | Wednesday Dec 16 | Final Exam (11 am to 1:30 am) |
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As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. –Erian Armanios

Emergency Phone Numbers: In case of an on-campus emergency, call the UT Arlington Police Department at **817-272-3003** (non-campus phone), **2-3003** (campus phone). You may also dial 911. Non-emergency number 817-272-3381

Special Note from your Instructor:

Learning is a two-way process. I expect you to put forth your best effort as I do. Be assured that I am your best fan. I applaud as you progress, and brag about your achievements at every opportunity.