

**The University of Texas at El Paso**  
**MECH 4395: Advanced Mechanics of Materials**  
**Fall 2020**

<b>Instructor:</b> Alejandra G. Castellanos, Ph.D. Department of Mechanical Engineering A116 Engr. Building <a href="mailto:castellanosa@utep.edu">castellanosa@utep.edu</a>	<b>Office Hours:</b> MW 4:00-5:00 pm or by appointment through Zoom. <b>A link to the Zoom session will be emailed on Aug 24<sup>th</sup>.</b>
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**Class meeting time and location:** MW 12:00 pm -1:20 mm through Zoom. **A link to the Zoom session will be emailed on Aug 24<sup>th</sup> before the class start.**

**Catalog Description:** Analysis and design of load-carrying members, shear center, unsymmetric bending, curved beams, beams on elastic foundations, theories of failure, thick-walled cylinders, and design to prevent failure by elastic deformation, plastic deformation and fracture.

**Prerequisites:** MECH 2322: Mechanics of Materials

**Course objectives:**

- Enable students to obtain viable approximations to the solutions of problems in solid mechanics that are relevant to design, without “full-field” (e.g. FEA) modeling and computer solutions.
- Make the student critically aware of the nature of the approximations that are commonly invoked to obtain such “strength of materials” solutions and their likely impact on the reliability ad robustness of related design decisions.
- Enable students to understand common mechanisms of failures, to analyze potential designs for criticality, and produce design parameters that can be expected to be reasonable safe from failures.

**Textbooks:**

- (Recommended) Cook and Young, Advanced Mechanics of Materials, 2<sup>nd</sup> ed., 1999

The material covered in class will parallel the text, but it will not duplicate entirely. You are responsible for the content covered in the lectures. (see schedule for topics)

**Other course materials:**

- Any Mechanics of Materials (MoM) textbook. A free e-book on Introductory Mechanics of Materials by M. Vable can be downloaded at <http://madhuvable.org/books-2/introduction/>
- Supplemented example problems posted in Blackboard.
- Slides posted in Blackboard. (Class notes will **NOT** be uploaded nor the class).

**Course home Page:** The “Course Home Page” has been created on Blackboard. Make sure you have access to this site; it will be used to distribute lecture notes, assignments and grades. The email distribution list for the class will be used for announcements and remainders. **Check your email account on a regular basis.**

**Grading:**

Homework	30%
Exam 1	15%
Exam 2	15%
Exam 3	20%
Exam 4 (Not comprehensive)	20%
<b>Total</b>	<b>100%</b>

Grading will be conducted on an absolute scale. Under this system it is possible for the entire class to get an A or the entire class to get an F depending on the ability and performance of the individuals in the class. It is also easy for you to evaluate how you are doing in the class during the semester. The following criteria will be used to assign a grade for the course:

100-91%	A
81-90%	B
75-80%	C
70-74%	D
<70%	F

### **Homework:**

All problems should be worked on a separate piece of paper. One to two problems will be randomly selected for grading from each assigned homework set.

For **Full Credit**, each homework problem must include the following information:

- Your name
- Problem number
- A diagram describing the problem when appropriate (e.g. Free body diagram)
- State appropriate formula
- Complete and detail solution: step-by-step solution and appropriate units.
- Write 2-3 sentences describing in words the concepts covered in the problem

Homework is due at the beginning of each class (see schedule for dates) through Blackboard. Late homework is NOT accepted and will result in a zero grade. The lowest homework grade over the course of the semester will be dropped.

### **Exams:**

There will be four exams. All exams are closed book and closed notes with the following exceptions:

For Midterm Exams 1 and 2, students are allowed to bring notes on one 8.5" x 11" sheet of paper with notes on *one side only*.

For Midterm Exam 3 and Final Exam (Exam 4), students are allowed to bring notes on one 8.5" x 11" sheet of paper with notes on both sides.

**The note sheets must be written by the student. Photocopies are NOT allowed. Student will turn in their note sheets with their exams. If two students have the same note sheet, a 50% reduction will be applied to each problem, which means that the maximum grade that you can obtain is 50.**

Exams will be available in Blackboard and send by email at 12:00 pm on the day of the exam and it will be due at 1:20 pm through blackboard or by email. Exams that are submitted later than this time will not be graded and will result in 0.

- The exams will be theory questions and problems.
- During your exam, you need to enable the camera and microphone of your computer or phone. This will allow you to ask me any question that you might have and it will allow me to see the progress of your test.
- You will need to take pictures/scan the pages of the problem that you solve along with your note sheet. Then you need to upload them to blackboard before 1:20 pm.

***If you arrive more than 15 minutes late on an exam, you will not be allowed to enter the examination room.*** There will be no makeup exams administered. No exceptions!

Please observe the university's academic regulations outlined in the UTEP Graduate Catalog (<http://catalog.utep.edu/grad/>), in addition to more detailed course policies described below.

**Email Policy:**

The best communication method is through email, office hours and during class. I will reply to general questions or concerns within 2 to 3 business days, Monday through Friday, during business hours (8:00AM-5:00PM). Emails received after 5:00PM, may not be responded to until the next business day.

- If the answer is in the syllabus, I will not reply unless the question is about clarifying information.
- I do not answer emails during the weekend.
- I do not explain complete lectures or solved problems through email. If you need clarification on one of the topics, attend my office hours. If you cannot make it, please schedule an appointment.

**Bottom line:** Ask questions in class and during office hours.

**Attendance Policy:**

Attendance is mandatory. Anyone with 5 or more absences will be dropped from the class. A drop for not attending will count toward the State Allowed Six Drop Limit. If you are failing the class at the time of the drop you may also be given a WF designation. Be advised that a drop could adversely impact visa status, financial aid and other programs. Students must arrive to class on time. If you will not be able to make it to the class session, contact the instructor in advance via email.

As per UTEP rules, you may be asked to show a UTEP ID at any time during class. Anyone who is present and/or registered in the class will be subjected to disciplinary action unless the instructor gives prior approval.

**Excused Absence for Exams:**

The UTEP catalog allows Exam Absence to be excused ONLY for University-Recognized Activities or other specific situations listed on the Academic Catalog. You must notify the instructor with at least **10 days prior to the absence**. Medical absence is NOT allowed in the UTEP catalog. If the student is absent from a test, the exam will be graded as zero (0).

**Students with special needs:**

Students with disabilities or special need, including both permanent disabilities (including learning disabilities, Attention Deficit Disorder, visual, mobility and hearing impairments, psychological disabilities, and chronic systemic disorders) as well as some temporary medical conditions (e.g. broken arm), are encouraged to see the UTEP Disables Student Services Office (DSSO) located at Union East Room 106 or contact them at (915) 747-5143 or at [dss@ute.edu](mailto:dss@ute.edu).

**Diversity:**

Diversity is a source of strength, creativity, and innovation. All students in this course are expected to value the contributions of each person and respect the ways in which their identity, culture, background, experience, status, abilities and opinion enrich our learning experience and university community.

**Departmental Policy****Academic Honesty:**

- During exams and quizzes, you are not allowed to use any form of wifi enabled electronic device, including cell phones or other electronic communication devices or methods (wrist watches, earbuds, etc.). No wrist watch or other electronic device may be worn. Calculators and watches may be subject to inspection. You may be asked to temporarily remove glasses to allow for their inspection.
- You may not bring backpacks, hats, bulky coats or hoodies into the exam room. Lockers are not available at the exam site so plan and leave your belongings in a secure location. You may NOT sit them in a corner of the exam room.
- You must show your work for all problems. You must use the paper provided by the instructor. If no work is shown you may not receive credit. After the exam, the instructor may require you to explain how you solved a problem on the exam. If you refuse to or cannot explain your work you may be subject to disciplinary action.

- No electronic version of the book, loose paper print-outs of the book or extra sheets of paper of any kind are allowed unless explicitly mentioned in writing by the instructor. As a part of the zero-tolerance policy, if you have a cellphone or other electronic device capable of communication on your person; or if any proctor sees or hears any electronic device during the exam or if you share your work with someone else, you will be reported to the proper authorities and you may receive a zero on the exam or an F in the class. Other actions including suspension may also be pursued.
- No one will be allowed to leave the room during an exam. This includes restroom breaks.
- University approved recording devices may be located at various locations in the room and may be out of sight of the students. These recordings will be managed according to the UTEP approved regulations for such media. The instructor may create a record of your activity during the exam and may take photographs of your work during the exam.
- If you are suspected of scholastic dishonesty you may or may not be directly confronted about your conduct by the instructor or proctor. You will however, be reported to the Office of Student Conduct and Conflict Resolution (OSCCR) and your exam may not be admissible. Your grade in the class may not be available until OSCCR makes a final ruling, this may adversely impact your ability to enroll in other classes.
- If you arrive more than 15 minutes late to an exam, you will not be allowed to take the examination.
- There will be no makeup exams administered. If you have a university approved excuse, your instructor will have a process for determining how to handle the missing grade outlined in the syllabus. However, no makeup exams will be given.
- If you miss more than one exam, the instructor may choose to administratively drop you from the class. This may adversely impact a visa and financial aid.
- No food or drink may be brought into the examination room.
- Departmental policy allows for the use of assigned seats. All students must present their UTEP issued ID prior to and during every exam and may be required to sign in. Not having a UTEP issued ID when asked will result in forfeiture of the exam. No other IDs will be accepted.
- Scholastic dishonesty on homework, lab assignments and all other class assignments will be held to the same standards and requirements of academic honesty as quizzes and exams.

### **Harassment policy:**

The department has a zero-tolerance policy harassment. Engagement in any behavior considered harassment would be reported to the proper authorities. In addition to generally understood forms of harassment, the department also treats the following behavior as harassment:

- Repeated emails and/or calls regarding subjects that have already been addressed. Once a decision has been made, or a question answered, a student who continues to ask the same question will be given a warning by the recipient of the email/call. If the student continues, the behavior will be reported. Questions that seek understanding of course material are not harassment, but repeated questions about a grade or n administrative decisions are.
- Grades are not negotiable, ever. If you believe a grading mistake has been made, you must follow the process described in the UTEP catalog. Any request for a grade elevation that is NOT based on mistake is considered harassment and will be reported immediately.
- Remaining in an office after the occupant requests you to leave is considered harassment and potentially threatening. You will be reported immediately without warning and depending on the severity, may be reported to law enforcement.
- Similar behavior towards department staff and student advisors will also be treated as harassment, including persistent phone calls, emails and badgering. Department staff and student advisors are there to help students and should be treated with due respect.

**MECH 4395 Schedule**

The approximate schedule is below. Slight changes may occur as needed.

Week	Date	Topic	Assignment
1	8/24	Course overview, review of Statics, MOM and Eng of Mat	<b>Read syllabus</b>
	8/26	Review of Statics, MOM and Eng of Mat	
2	8/31	Review of Statics, MOM and Eng of Mat/ Principal Stresses	<b>HW 1 due by midnight (Blackboard)</b>
	9/2	Principal Stresses	
3	9/7	Oct and max shear stress, 3D Hooke's law	<b>HW 2 due by midnight (Blackboard)</b>
	9/9	Strain energy density/Review Test 1	
4	9/14	<b>Test 1: Covers lectures from Aug 24 to Sept 9</b>	
	9/16	Failure Criteria	
5	9/21	Plasticity	<b>HW 3 due by midnight (Blackboard)</b>
	9/23	Plasticity	
6	9/28	Fracture Mechanics	<b>HW 4 due by midnight (Blackboard)</b>
	9/30	Fracture Mechanics	
7	10/5	Fatigue	<b>HW 5 due by midnight (Blackboard)</b>
	10/7	Fatigue, Review Test 2	
8	10/12	<b>Test 2: Covers lectures from Sept 16 to Oct 7</b>	
	10/14	Elasticity	
9	10/19	Airy Stress Function	<b>HW 6 due by midnight (Blackboard)</b>
	10/21	Pressurized Cylinders	
10	10/26	Torsion, warping function, Prandtl stress function	<b>HW 7 due by midnight (Blackboard)</b>
	10/28	Membrane Analogy, Thin-walled cross sections	
11	11/2	Thin-walled cross sections	<b>HW 8 due by midnight (Blackboard)</b>
	11/4	Review Test 3	
12	11/9	<b>Test 3: Covers lectures from Oct 14 to Nov 4</b>	
	11/11	Unsymmetric Bending	
13	11/16	Unsymmetric Bending	<b>HW 9 due by midnight (Blackboard)</b>
	11/18	Shear Flow	
14	11/23	Shear Flow	<b>HW 10 due by midnight (Blackboard)</b>
	11/25	Shear Center	
15	11/30	Shear Center	<b>HW 10 due by midnight (Blackboard)</b>
	12/2	Review	
16	12/7	<b>Final Exam: Covers lectures from Nov 11 to Dec 2 schedule at the same time as the Final Exam</b>	