The University of Texas Rio Grande Valley
Department of Mechanical Engineering

MECE 3321: Mechanics of Solids – Spring 2025

Course Information

Class Schedule/Room: TR 2:00 PM – 3:15 PM/EENGR 1.236
PLTL: 3:30 PM – 4:45 PM/TBA

Instructor: Samantha Ramirez

Office: EENGR 3.261

Office Hours: MW 10:00 AM – 11:30 AM or by appointment

Email: samantha.ramirez@utrgv.edu

Website: http://faculty.utrgv.edu/samantha.ramirez/

Pre-requisites: "C" or better in Calculus II (MATH 2414) **and** Statics (MECE 2301) **and** Engineering Materials (MECE 2340)

Catalog Description: This course covers internal forces and deformation of solids, concepts of stress and strain, formulas for stress and deflection for elastic bars, shafts, and beams, stress and strain transformation, and theories of failure.

Required Materials: McGraw-Hill Connect (see Homework), non-programmable calculator, device for scanning

Recommended Textbook: *Mechanics of Materials,* Beer, McGraw Hill Education, New York, New York. (8th edition)

Mechanics of Materials, Hibbeler, R.C., Prentice Hall Inc., Upper Saddle River, New Jersey. (10th edition)

Course Modality: Traditional face-to-face. See Attendance and Classroom Etiquette for more info.

Grading Policy

3 Module Exams	45% (15% each)
Comprehensive Final Exam	20%
Quizzes	15%
Homework	10%
PLTL	10%

Course Outcomes and Assessment:

The student should be able to

1. Define the study of mechanics of materials and the concepts of internal loadings, normal and shear stress, and allowable stress (factor of safety); and design members subjected to an axial load or direct shear.
2. Define the concepts of normal and shear strain and be able to calculate the normal and shear strain in a structure under axial loading.
3. Define the concepts of the stress-strain diagram (including the difference of stress-strain diagrams between various materials) and Poisson's ratio.
4. Design statically determinate and indeterminate axially loaded members including the case of thermal stresses.
5. Design statically determinate and indeterminate torsional loaded members including noncircular shafts.
6. Draw shear and bending moment diagrams for beams and shafts using the analytical and graphical method and calculate normal and shear stresses for straight members with symmetric cross-sections subjected to bending loads.
7. Calculate the shear stress in a beam having a prismatic cross section and made from a homogeneous linear elastic material.
8. Derive the equation of the elastic curve for deformation of a member using superposition (including statically indeterminate beams) and use this equation to find the deflection and/or slope at any point along the length of the member.
9. Analyze members or structures where there are combinations of various different types of loadings (axial, torsion, bending, and shear) applied simultaneously to a member or structure and solve for circumferential (or hoop) stress and longitudinal (or axial direction) stress in "thin" walled vessels under pressure.

BSME 2-Peat Rule (applies to all BSME students on catalogs from 2020-2021 onward)
Students are allowed to **repeat** the following entry-level mechanical engineering courses (MECE 2301 Statics, MECE 2302 Dynamics, MECE 2340 Engineering Materials, MECE 3321 Mechanics of Solids, MECE 2335 Thermodynamics I, and MECE 3440 Mechanical Engineering Analysis) only once. If you did not get a C or better in any of the aforementioned courses on your second attempt, you will have to submit an appeal to the ME Appeals Committee requesting permission to take the course for a third attempt. In your appeal letter, students must explain the reason or reasons for prior poor performance (supporting documentation can be submitted as well) and must provide a reasonable plan to ensure the third attempt is successful. No student is guaranteed a third attempt at a class. If a student does not supply an adequate explanation for their situation and propose a meaningful plan for success, the committee may deny the request. If you have a pattern of repeating many courses, the committee may also deny the request. If the request is approved and there are sufficient seats in the course, the student will be allowed to attempt the course for the last time. **If you have attempted a course three times without obtaining a "C" or better, you will not be permitted to enroll in that course at UTRGV.**

EXAMS

You will have a total of 5 exams in this course.

- You will have a pre-test that covers prerequisite content (Calculus II, Statics, Engineering Materials). This will be an **online exam** in McGraw-Hill Connect that you must complete by Sunday, 1/26/25 by 11:59 PM. It will count for 4 quiz grades.

- You will have 3 module exams that will be administered **in-person** outside of class on the dates and times shown in the Course Calendar. Please make appropriate accommodations for these 3 exams since you know about them on Day 1 of this semester.
- Your final exam will be comprehensive (Modules 1-4) during the scheduled final exam time (see Course Calendar for date and time).

Students will only be allowed to use the provided exam booklet (for Exam 3 and Final Exam only), a non-programmable calculator, and something to write with for the exam. Absolutely no bathroom breaks, programmable calculators, calculator covers, cell phones, laptops, iPads, iPods, or any other smart technology devices are allowed during exams.

Once an exam is graded and returned to you, you only have 24 hours to contest your exam grade. Please compare your graded exam to the exam solution provided to you in Blackboard. If, after doing so, you think a grading mistake was made, please email me to let me know. I will review my scan of your graded work and let you know my decision.

In the event that I, or another faculty member, am not able to administer an exam in person on the scheduled day, I will administer the exam via Zoom. Students will be required to attend a special Zoom session emailed to you for the duration of the exam where they will be required to have a camera on to be monitored. Students will only be allowed to use the provided exam booklet for the exam. All exam work will be scanned and uploaded in Blackboard for grading.

QUIZZES

- You will have a quiz every Tuesday in class for each module section.
    - SmartBook assignments must be completed in MH Connect before class begins on the day we start the topic and are worth up to 5 points extra credit on the respective quizzes for each module section. The number of points is dependent on the grade that you get on the assignments. For example, if you get a 100, then you get 5 points extra credit. If you get a 90, then you get 4.5 points extra credit.

HOMEWORK

Required McGraw Hill Connect will be utilized for homework assignments.

- All assignment links are found in BlackBoard Learn.
- **Homework will be due at 2:00 PM.** Late assignments will be accepted until 11:59 PM with a 10% penalty. After 11:59 PM, no late assignments will be accepted.
- It is suggested to work problems out using the following format on the MECE Homework Paper (Found on my website), engineering paper, or graph paper.
    - Problem statement & picture (hand drawn or copy/pasted)
    - Summarized knowns, unknowns to be found, and possible equations to use
    - Free body diagram(s)
    - Calculations in appropriate units
    - Final boxed answer in correct units
- You will be assigned 1-2 videos to watch outside of class as homework before class begins. You will be required to upload your handwritten notes from those videos by our scheduled class time.
    - The use of classroom recordings is governed by the Federal Educational Rights and Privacy Act (FERPA), UTRGV's acceptable-use policy, and UTRGV HOP Policy STU 02-100 Student Conduct and Discipline. A recording of class sessions will be kept and stored by UTRGV, in accordance with FERPA and UTRGV policies. Your instructor will not share the recordings of your class activities outside of course participants, which include your fellow students, teaching assistants, or

graduate assistants, and any guest faculty or community-based learning partners with whom we may engage during a class session. **You may not share recordings outside of this course.** As referenced in UTRGV HOP Policy STU 02-100 Student Conduct and Discipline, doing so may result in disciplinary action.

PEER-LED TEAM LEARNING (PLTL)

- Attendance is required for your scheduled PLTL session (TR 3:30 PM – 4:45 PM) – 40%
    - Attendance can be marked as an absence by PLTL leader if you are not participating in the PLTL session. i.e. eating, sleeping, on phone, etc.
- Your work during each session will need to be submitted in Blackboard to be graded on completion by your PLTL. – 60%
    - The rubric below will be how your submitted work will be graded.

Score	Description
5, Excellent	All problems were attempted. All work is shown. Solutions were neat and use required format.
4, Good	Nearly all problems were attempted (missing 1 at most). Steps were sufficiently detailed.
3, Fair	Most problems were attempted (missing at most 2 problems). Steps may not be sufficiently detailed.
2, Poor	Majority of problems were attempted. Steps were missing or solutions were incomplete.
1, Unacceptable	A few problems were attempted. Solutions were incomplete. Work was missing for the majority of problems.
0, Missing	Assignment was not submitted.

Attendance & Classroom Etiquette

- Attendance will be taken daily in lecture and PLTL.
- You are expected to participate in class by asking questions, calculating answers, working with others on group assignments, etc.
- This course is scheduled as a traditional face-to-face class and will be held as. I will not hold live Zoom sessions during our scheduled class time, but pre-recorded videos will be available to you sometime after the course content is covered.
- In the event that I am not able to attend f2f classes due to illness, I will hold online synchronous class via Zoom if I am able to. If I am also not able to hold online synchronous class, then I will assign pre-recorded lecture videos for the class day(s) until I can return to live.
- If, during the semester, **you fall ill and are not able to complete coursework**, you will be allowed to make up any homework, quizzes, and/or exams that are missed as long as **you email me letting me know about your situation** and provide a doctor's excuse/test results (with your name and date of birth). Do not wait until after due dates/exam dates to let me know.

Course Calendar

There is a course calendar in Blackboard for you to use. It will show you the most up-to-date due dates and times for all assignments and exams in this course.

Module 0: Statics Review	**Pre-Test: Due by 11:59 PM on Sunday, 1/26/25 in Connect**
Module 1: Internal Loads	**Exam 1: Friday, 2/21/25 from 11 AM – 1 PM in ESCNE 2.104**
A: Method of Sections	
B: Normal and Torsion Diagrams	
C: Shear & Bending Moment Diagrams	5.1 – 5.2
Module 2: Stress	**Exam 2: Friday, 3/28/25 from 11 AM – 1 PM in ESCNE 2.104**
A: Stress, Stress Concentrations	1.2, 1.4, 1.55, 2.10, 2.11
B: Shear Stress Due to Torsion	3.1A, 3.1C, 3.4, 3.5
C: Normal Stress Due to Bending	4.1A, 4.2
D: Shear Stress Due to Shear Force	6.1
E: Combined Loading	8.3
Module 3: Strain	**Exam 3: Friday, 4/25/25 from 11 AM – 1 PM in ESCNE 2.104**
A: Strain	2.1A, 2.7, 2.8
B: Axial Deformation	2.1B-F, 2.12, 2.1G, 2.4
C: Angle of Twist	3.1B, 3.2, 3.9
D: Beam Deflection	9.4A
Module 4: Statically Indeterminate Situations	
A: Beam Deflection	9.4B
B: Axial and Thermal	2.2, 2.3
C: Torsion	3.3
Comprehensive Final Exam	**Tuesday, 5/13/25 from 1:15 PM – 3:00 PM in EENGR 1.236**

UTRGV Policy Statements

Scholastic Integrity:

Members of the UTRGV community uphold the Vaquero Honor Code's shared values of honesty, integrity and mutual respect in our interactions and relationships. In this regard, academic integrity is fundamental in our actions, as any act of dishonesty conflicts as much with academic achievement as with the values of honesty and integrity. The Writing Center is an excellent resource to assist in learning about and avoiding plagiarism in writing. Violations of academic integrity include, but are not limited to: cheating, plagiarism (including self-plagiarism), and collusion; 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 (Board of Regents Rules and Regulations, STU 02-100, and UTRGV Academic Integrity Guidelines). **All violations of Academic Integrity will be reported to Student Rights and Responsibilities through** Vaqueros Report It**.**

Suggested Approaches on Artificial Intelligence (AI) Technologies

Generative AI technologies are growing and evolving rapidly. We have an opportunity to explore the benefits, challenges, and ethical decisions that encourage us all to reimagine our assignments and assessment practices. Relevant to how students contribute to and make knowledge in your area of study, please consider how you want to approach generative AI technologies in your courses. To learn more about AI technology, please visit this page on the Center for Online Learning and Teaching Technology website. Additionally, you may consider the suggested approaches and examples recommended

on this page from the Center for Teaching Excellence. Please modify as you see fit and align to your teaching values, beliefs, and course learning objectives.

Course Drops:

According to UTRGV policy, students may drop any class without penalty earning a grade of DR (drop) until the official drop date. Following that date, students must be assigned a letter grade and can no longer drop the class. Students considering dropping the class should be aware of the "3-peat rule" and the "6-drop" rule so they can recognize how dropped classes may affect their academic success. The 6-drop rule refers to Texas law that dictates undergraduate students may not drop more than six courses during their undergraduate career. Courses dropped at other Texas public higher education institutions will count toward the six-course drop limit. The 3-peat rule refers to additional fees charged to students who take the same class for the third time.
Students can withdraw from a course through the *Office of the Registrar* on or prior to:

- February 5, 2025: Last day to drop a class before it appears on the transcript and count toward the "6-drop" limit.
- April 10, 2025: Drop/Withdrawal Deadline; last day for students to drop the course and receive a "DR" grade. After this date, students will be assigned a letter grade for the course that will count on the GPA.

Students with Disabilities:

Students with a documented disability (physical, psychological, learning, or other disability which affects academic performance) who would like to receive reasonable academic accommodations should contact Student Accessibility Services (SAS**)** for additional information. The student must apply for accommodations using the *mySAS* portal and is responsible for providing sufficient documentation of the disability to SAS. Upon submission of the request, students should expect to participate in an interactive discussion, or an intake appointment, with SAS staff. Accommodations may be requested at any time but are not retroactive, meaning they are valid moving forward after approval by SAS. Students should contact SAS early in the semester/module for guidance.
Students who experience a broken bone, severe injury, or undergo surgery may also be eligible for temporary accommodations. Please contact Student Accessibility Services (SAS**)** for more information.

Pregnancy, Pregnancy-related, and Parenting Accommodations

Title IX of the Education Amendments of 1972 prohibits sex discrimination, which includes discrimination based on pregnancy, marital status, or parental status. Students seeking accommodations related to pregnancy, pregnancy-related condition, or parenting should submit the request using the form found at Pregnancy and Parenting | UTRGV.
For questions about campus support services or public benefit programs for students who are pregnant, or parenting contact the Parenting Liaison officer in the Dean of Students Office.
Edinburg: UCTR rm. 325 Phone: 956.665.2260
Brownsville: BSTUN 1.20 Email: dos@utrgv.edu

Student Accessibility Services

Student Accessibility Services has offices on Brownsville and Edinburg campuses. Visit the SAS web page to learn more and explore accessibility services.

Sexual Misconduct and Mandatory Reporting:

In accordance with UT System regulations, your instructor is a "Responsible Employee" for reporting purposes under Title IX regulations and so must report any instance of sexual misconduct, which includes sexual assault, stalking, dating violence, domestic violence, and sexual harassment to the Office of Title IX and Equal Opportunity (otixeo@utrgv.edu). More information can be found on the OTIXEO website. If students, faculty, or staff would like confidential assistance, or have questions, they can contact OAVP (Office for Advocacy & Violence Prevention).

Dean of Students

The Dean of Students office assists students when they experience a challenge with an administrative process, unexpected situation, such as an illness, accident, or family situation, and aids in resolving complaints. Additionally, the office facilitates

student academic related requests for religious accommodations, support students formerly in foster care, helps to advocate on behalf of students and inform them about their rights and responsibilities, and serves as a resource and support for faculty and campus departments.
Vaqueros Report It allows students, staff, and faculty a way to report concern about the well-being of a student, seek assistance in resolving a complaint, or report allegations of behaviors contrary to community standards or campus policies. The Dean of Students can be reached by email (dos@utrgv.edu), phone (956-665-2260), (956-882-5141), or by visiting one of the following office locations: Cavalry (BCAVL) 204 or University Center (EUCTR 323).

Course Evaluation:

Students have the opportunity to complete an ONLINE evaluation of this course, accessed through your my.UTRGV account. Course evaluations are used by the instructor to inform revisions of the course to ensure student success. Course evaluations are also used by the instructor for annual performance review and promotion applications, teaching award applications, among others.
Online evaluations will be available on or about:
Spring 2025 Regular Term April 16 – May 7, 2025

Student Support Resources:

We are committed to your personal, academic, and professional success; please know you can reach out to me for questions and/or I can help you identify the resources you need. UTRGV offers student support resources designed to contribute to your well-being and academic excellence.
Students seeking academic help in their studies can use university resources in addition to an instructor's office hours. University Resources include the Advising Center, Career Center, Counseling Center, Learning Center, and Writing Center. These centers provide services such as tutoring, writing help, counseling services, critical thinking, study skills, degree planning, and connections student employment (through *JobX* and *HR Student Employment*). In addition, services, such as the Food Pantry are also provided. Locations are listed below.

Center links	**E-mail**
Advising Center	AcademicAdvising@utrgv.edu
Career Center	CareerCenter@utrgv.edu
Counseling Center	Counseling@utrgv.edu
Food Pantry	FoodPantry@utrgv.edu
Learning Center	LearningCenter@utrgv.edu
University Library	circulation@utrgv.edu
Writing Center	WC@utrgv.edu
UCentral	ucentral@utrgv.edu

Financial Need
Students who demonstrate financial need have a variety of options when it comes to paying for college costs, such as scholarships, grants, loans and work-study. Students should visit the Student Services Center (U Central) for additional information. U Central is located in BMAIN 1.100 (Brownsville) or ESSBL 1.145 (Edinburg) or can be reached by email (*ucentral@utrgv.edu*) or telephone: (956) 882-4026. In addition to financial aid, U Central can assist students with registration and admissions.
Blackboard Support
If you need assistance with course technology at any time, please contact the Center for Online Learning and Teaching Technology (COLTT).

Campus:	Brownsville	Edinburg
Location	Casa Bella (BCASA) 613	Marialice Shary Shivers (EMASS) 3.142

Campus:	Brownsville	Edinburg
Phone	(956)-882-6792	(956)-665-5327
Toll Free	1-(866)-654-4555	
Support Tickets	Submit a Support Case via our *Ask COLTT Portal*	
Online Support	*Chat with a Support Specialist online*.	
24/7 Support	Need Blackboard assistance after hours? You can call our main office numbers, (956)-882-6792 or (956)-665-5327, to speak with a support representative.	