University of Texas Rio Grande Valley

College of Engineering and Computer Science

Department of Mechanical Engineering

Semester:	Spring 2018
Course Number & Title:	MECE 3321 Mechanics of Solids
Class Schedule/Room:	Section 03: TR 9:25 AM – 10:40 PM/EMAGC 2.206 Section 01: TR 1:40 PM – 2:55 PM/EMAGC 1.206
Instructor:	Samantha Ramirez
Office:	EPORT 1.104A
Office Hours:	TR 11:00 AM – 12:00 PM
Email:	samantha.ramirez@utrgv.edu
Website:	http://faculty.utrgv.edu/samantha.ramirez/
Pre-requisites:	"C" or better in Calculus II (MATH 1470) and Statics (MECE 2303)
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.
Textbook:	*Mechanics of Materials*, Hibbeler, R.C., Prentice Hall Inc., Upper Saddle River, New Jersey. (10^{th} edition)

Grading Policy:		
	3 Mid-term Exams	20% each
	Final Exam	20%
	Quizzes	10%
	Homework	10%

Attendance:

- Attendance will be taken every time the class meets. Any student arriving to class **5 minutes** after the class has started will not be allowed in class. Students will be allowed a **maximum** of **three** absences for the whole semester for classes meeting twice a week. **Five points** will be deducted from the final grade (100%) for each absence exceeding the maximum allowable unless documentation justifying that absence is provided.
- Students **will not** be permitted to leave the classroom during lectures and exams except for **extreme emergencies**.

Homework, Quizzes, and Exams:

- Modified Mastering Engineering will be utilized for homework assignments. This will be accessed through Blackboard.
    - Absolutely no late assignments will be accepted
    - A hard copy of each homework assignment will be submitted in class the day the assignment is due in Mastering Engineering 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
- There will be an in-class quiz on Tuesdays over 1 problem from the homework assignments due since the last quiz.
    - Loss of homework assignment credit if:
        - A hard copy of the homework is not submitted
        - The hard copy of the homework is copied directly from the solution manual
        - If you do not receive a passing grade on the corresponding quiz
            - Note: A passing quiz grade is subject to the instructor's discretion.
- Exams will be given outside of class on the dates shown in the tentative course content schedule.
    - Absolutely no programmable calculators, calculator covers, cell phones, laptops, iPads, iPods, or any other smart technology devices are allowed during exams.
    - You only have 24 hours to contest your exam grade after it is returned.

Course Outcomes:

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 homogeneous linear elastic material.
8. Derive the equation of the elastic curve for deformation of a member via integration and superposition (including static 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 "this" walled vessels under pressure.
10. Define the concept of plane stress, be able to use the general equations of plane stress transformations and Mohr's circle to determine the shear stress at a point in a structure under a variety of loadings, and determine principal stresses and maximum in-plane stress shear stress.

Scholastic Integrity:

As members of a community dedicated to Honesty, Integrity and Respect, students are reminded that those who engage in scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and expulsion from the University. Scholastic dishonesty includes but is not limited to: cheating, 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. Since scholastic dishonesty harms the individual, all students and the integrity of the University, policies on scholastic dishonesty will be strictly enforced (Board of Regents Rules and Regulations and UTRGV Academic Integrity Guidelines). All scholastic dishonesty incidents will be reported to the Dean of Students.

Drop Policy:

Students can withdraw from a course through the *Office of the Registrar* on or prior to:

- January 31, 2018: Last day to drop a class before it appears on the transcript and counts toward the "6-drop" limit.
- April 12, 2018: 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.

Course Drops:

According to UTRGV policy, students may drop any class without penalty earning a grade of DR 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 that 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 with Disabilities:

If you have a documented disability (physical, psychological, learning, or other disability which affects your academic performance) and would like to receive academic accommodations, please inform your instructor and contact Student Accessibility Services to schedule an appointment to initiate services. It is recommended that you schedule an appointment with Student Accessibility Services before classes start. However, accommodations can be provided at any time. **Brownsville Campus**: Student Accessibility Services is located in Cortez Hall Room 129 and can be contacted by phone at (956) 882-7374 (Voice) or via email at accessibility@utrgv.edu. **Edinburg Campus:** Student Accessibility Services is located in 108 University Center and can be contacted by phone at (956) 665-7005 (Voice), (956) 665-3840 (Fax), or via email at accessibility@utrgv.edu.

Sexual Harassment, Discrimination, and Violence:

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, occurring during a student's time in college, of sexual assault, stalking, dating violence, domestic violence, or sexual harassment about which she/he becomes aware during this course through writing, discussion, or personal disclosure. More information can be found at www.utrgv.edu/equity, including confidential resources available on campus. The faculty and staff of UTRGV actively strive to provide a learning, working, and living environment that promotes personal integrity, civility, and mutual respect in an environment free from sexual misconduct and discrimination.

Course Evaluation:

Students are required to complete an ONLINE evaluation of this course, accessed through your UTRGV account (http://my.utrgv.edu); you will be contacted through email with further instructions. Online evaluations will be available April 11, 2018 – May 2, 2018. Students who complete their evaluations will have priority access to their grades.

Tentative Course Content

	Topics	Chapters/Sections
1	Introduction, Syllabus, Statics Review	1.1-1.2
2	Internal Loads, Stress	1.2-1.3
3	Average Shear Stress, Allowable Stress	1.4-1.6
4	Strain, Strain Examples	2.1-2.2
5	σ-ε Diagrams, Hooke's Law	3.1-3.4
6	Poisson's Ratio, τ-γ Diagram	3.6-3.7
7	Poisson's Ratio, τ-γ Diagram, Examples	3.6-3.7
	Exam 1 (February 23,2018 2:00PM ESCNE 2.102)	1, 2, 3
8	Axial Load: Stress, Strain, and Elastic Deformation	4.1-4.2
9	Axially-Loaded Statically Indeterminate Problems	4.3-4.4
10	Axially-Loaded Statically Indeterminate Problems	4.4-4.5
11	Thermal Stress, Stress Concentrations	4.6-4.7
12	Torsional Loads: Stress, Power Transmission	5.1-5.3
13	Angle of Twist	5.4
14	Deflections & Statically Indeterminate Members	5.4-5.5
15	Noncircular Shafts, Stress Concentrations	5.6 & 5.8
	Exam 2 (March 23, 2018 2:00PM ESCNE 2.102)	4, 5
16	Bending: Shear & Moment Diagrams	6.1-6.2
17	Bending: Shear & Moment Diagrams	6.1-6.2
18	Bending: Shear & Moment Diagrams	6.1-6.2
19	Bending: Stress, Strain, Elastic Deformation	6.3-6.4
20	Transverse Shear, Transverse Shear Examples	7.1-7.2
21	Transverse Shear, Transverse Shear Examples	7.1-7.2
	Exam 3 (April 13, 2018 2:00PM TBD)	6, 7
22	Combined Loading	8.1
23	Combined Loading	8.2
24	Combined Loading	8.2
25	Combined Loading	8.2
26	Beam Deflections: Via Integration	12.1-12.2
27	Beam Deflections: Via Superposition	12.5
28	Statically Indeterminate Beams: Via Superposition	12.6 & 12.9
	Final Exam	8, 12