

MENG 3306 – Mechanics of Materials

Course Syllabus

Semester / Year	Spring 2022
Catalog Description	A required course providing undergraduate mechanical engineering students with fundamentals of 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.
Prerequisites	Grade C or better in ENGR 2301 Mechanics - Statics
Section number	030 and 031
Instructor name	Ola Al-Shalash
Contact info	Office: Houston Engineering Center: A212 E-mail: oyalshalash@uttyler.edu
Class Type / Location	Hybrid, Face-to-face or Zoom synchronous/ Asynchronous Location: HEC B210
Class Time	030: Monday and Wednesday 12:30 PM - 1:55 PM 031: Monday and Wednesday 5:30 PM - 6:55 PM
Office Hours	Monday: 2:30 PM – 4:30 PM Wednesday: 2:15 PM – 3:15 PM or by appointment
No. of Credits	3 credits
Required Textbook	Mechanics of Materials, 10th edition , by R. C. Hibbeler
Optional References	N/A
Additional requirements	Handouts and manuals posted on Canvas
Evaluation Method	Grading: Exam 1 20 % Exam 2 20 % Final Exam 20 % Homework 20 % Quizzes 15 % Course Participation & Attendance 5 %
Grading Policy / Scale	Letter grades Scale: A => 90 – 100 B => 80 – 89 C => 70 – 79 D => 60 – 69 F < 60

	<p>Grade appeal Grades can be appealed by sending an email then meeting the instructor during office hours, but no later than three days after the grade has been posted. Moreover, students may appeal any grade reduction to the instructor if valid excuse with documentation is provided.</p>
Important events / dates	<p>Census date: January 24 Last day to withdraw: March 28 Exam 1: Week of February 21 Exam 2: Week of April 4 Final Exam: During finals week</p>
Attendance / Makeup policy/ other rules	<ul style="list-style-type: none"> • Attendance is expected per university policy. Regular attendance is highly recommended. It is imperative if you want to do well in this course. • Attendance will be taken and regularly checked using Canvas. Students who come to class after attendance is taken will be considered absent. • In case you have to miss a class, it is your responsibility to keep up with the class work and be informed of all announcements made in the class. • Students will not be permitted to leave the classroom during lectures except for extreme emergencies. • No email submission of assignments, HomeWorks, etc. All assignments MUST be submitted to Canvas for grading. • No makeups unless students provide a university accepted excused absence with proper documentation justifying the absence. • Student with SAR status should contact the UT Tyler Office of Student Accessibility and Resources for exam arrangements. • Any minor violation of the Student Behavior (see below) by a student as deemed by the instructor will result in a full letter grade reduction for each incident while any major violation(s), such as cheating and plagiarism, by a student as deemed by the instructor will result in automatic failing grade in the course.
Course Learning Outcomes / ABET & PEOs relation	<p>Expected Learning Outcomes By the end of this course, students will be able to:</p>

	<ol style="list-style-type: none"> 1. Use external loads including axial force, moment, torque, shear force to determine internal forces and moments for a variety of structures and structural elements. 2. Determine the state of stress at a point different stress configurations and combined loading and find principal stresses and directions both analytically and graphically using the Mohr's circle diagram. 3. Relate stress to strain using material properties and analyze the state of strain at a point and use strains to calculate deformations. 4. Design shafts and beams and use load-deformation equations and other methods to calculate beam deflections.
Tentative Topics	<ul style="list-style-type: none"> • Normal and shear stress • Normal and shear strain • Mechanical properties of materials • Axial load • Torsion • Bending • Stress and strain transformation • Beam and shaft design • Deflections of beams and shafts
Other	<ul style="list-style-type: none"> • Tentative course schedule can be found at the end of this document. • Evaluation activities, Student Behavior, and other notes are listed below:

Pre-requisite knowledge:

- Calculus (integration and differentiation) and Linear Algebra (systems of equations)
- Vector Analysis (understanding of vector representations and operations)
- Statics (free body diagrams and equilibrium analysis)

Evaluation activities:

Exams:

- There will be three exams for this course, two exams during the semester and the final exam. The final exam will be comprehensive.

- Absolutely no cell phones, graphing calculators, laptops, iPads, iPods, smart watches, or any other smart technology devices are allowed in exams and quizzes. In case of the Zoom class type, only the exam window is allowed on the laptop screen (more instructions will be provided before each exam if this is the case).
- Students are not allowed to leave the examination room unless they submit their exam paper; scan and submit to Canvas in case of Zoom class type.
- Makeup exams for documented emergencies only.
- Late or no submission for the exam results in automatic grade of zero.
- Solutions of tests (quizzes and exams) must be well organized and neatly presented.
- Tests must be answered with pencil or black ink pen. Unclear handwriting may result in a lower grade.
- Answers reflecting the solutions manual are not considered correct and will be turned in to the Dean of Students as copying.
- In a Face-to-face lecture, exam grades will be returned, students will be allowed to view their exams, and the professor will keep original exams.

Quizzes:

- To ensure that students do their work and prepare for each class, one of the problems, from the homework, or a reading question from the subject that is already discussed will be chosen for a quiz.
- Quizzes will be **pop quizzes** that are assigned/ applied according to the topics covered in lectures.
- There will not be makeup quizzes. Absent students will not be allowed to retake quizzes and will result in a zero grade for the corresponding quiz.
- Answers reflecting the solutions manual are not considered correct and will be turned in to the Dean of Students as copying.
- Any discrepancy between the student's performance on the quiz and the homework assignment may result in loss of credit in the total homework grade.

Homework Policy:

1. Homework will be assigned after lecture and is due at the beginning of the class period after it is assigned unless other instructions are given. The homework problems will be posted on canvas. The hard-copy of the homework assignment has to be scanned and submitted to Canvas before class starts. It will be graded on the basis of format, grammar and spelling, technical content, and overall quality. Messy work will not be graded, and you will receive a zero.
2. Students may discuss their homework solutions with one another, but each student must submit their own, **independent** solution (i.e., you may not just copy someone else's homework).
 - All homework should include a clear statement of the problem to be solved, indicating the known and unknown parameters.

- Work should be handwritten or typed using a software on only one side of a standard letter size paper and stapled in the upper, left-hand corner.
- Draw neat and organized free-body diagrams, use a straight edge if necessary.
- Number all equations, indicate and describe variable substitutions and mathematical procedure, and highlight (enclose, or box) your answers.
- Always indicate appropriate units in answer and study them to determine if it is reasonable.
- Each problem needs to have the following: Given, Assumptions, Solutions, and a Box around your final answer with the appropriate unit.
- Number all your solution pages and write your name on each page at the upper, left-hand corner.
- These instructions apply to the exams and quizzes solutions as well.

Class Participation and Attendance:

Attendance is expected to lecture; taking notes and participating in discussions and class activities are required while in class.

Note:

Late submissions of assignments/ Homework (e.g. if due at 11:59:00 pm, then any time after such as 11:59:30 pm is late) will result in **20 % deduction per day** from the graded score.

Student Behavior:

- Academic dishonesty, in the form of cheating, fabrication, falsification, multiple submissions, plagiarism, and complicity, will not be tolerated. Regulations about academic dishonesty are contained in *A Student Guide to Conduct and Discipline at UT Tyler*, which may be obtained from the Office of Student Affairs.
- Any violation of the Student Behavior (see below) will result in grade reduction for each incident. Students may appeal the grade reduction to the instructor if valid excuse or reason can be given.
- The use of cellular phones during the class **is prohibited**.
- **No food or drink** is allowed in the classroom.

Student attitude:

- Given this is a professional, educational setting you are expected to dress and behave appropriately. A positive, mature attitude/behavior is expected from the students in all classes. Students disturbing directly or indirectly the class or other students will be asked to leave the classroom with the consequences associated to an absence.
- Students are encouraged to utilize any tutoring services available if needed and come prepared to each week's class. Each student is expected to work with the group in a

professional manner in case of any group activities. It is important to communicate clearly and professionally of any concerns or issues to the instructor.

- Canvas should be the primary mode of contacting the instructor so check the Canvas announcements and discussion board to check for information about the course. In addition, university provided patriots email should be the official communication method and you should check your email regularly. Use the above email address or Canvas messaging if you want to email the instructor. Please use **MENG 3306- your section, your question or concern title** in the email subject line. Please allow the instructor at least one to two business days to respond to your email. Emails with improper language will not be answered. Emails with same concerns or questions from multiple students will be answered/covered during class time.

Note:

The syllabus is subject to change during the semester as deemed necessary. Students will be notified for any major changes.

Important Covid-19 Information for Classrooms

Students are expected to wear face masks covering their nose and mouth in public settings (including classrooms and laboratories). The UT Tyler community of Patriots views adoption of these practices consistent with its Honor Code and a sign of good citizenship and respectful care of fellow classmates, faculty, and staff.

Students who are feeling ill or experiencing symptoms such as sneezing, coughing, digestive issues (e.g. nausea, diarrhea), or a higher than normal temperature should stay at home and are encouraged to use the UT Tyler COVID-19 Information and Procedures website to review protocols, check symptoms, and report possible exposure. Students needing additional accommodations may contact the Office of Student Accessibility and Resources at University Center 3150, or call (903) 566-7079 or email saroffice@uttyler.edu.

Recording of Class Sessions if applies

If, for any reasons, class sessions are going to be recorded by the instructor, then the recording will be for use by students enrolled in this course. Recordings that contain personally identifiable information or other information subject to FERPA shall not be shared with individuals not enrolled in this course unless appropriate consent is obtained from all relevant students. Class recordings are reserved only for the use of students enrolled in the course and only for educational purposes. Course recordings should not be shared outside of the course in any form without express permission.

University Policies:

UT Tyler Honor Code

Every member of the UT Tyler community joins together to embrace: Honor and integrity that will not allow me to lie, cheat, or steal, nor to accept the actions of those who do.

Student Standards of Academic Conduct

Disciplinary proceedings may be initiated against any student who engages in scholastic dishonesty, including, but 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, or material which has been submitted within a different course without explicit approval of the instructor, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.

- i. "Cheating" includes, but is not limited to:
 - copying from another student's test paper;
 - using, during a test, materials not authorized by the person giving the test;
 - failure to comply with instructions given by the person administering the test;
 - possession during a test of materials, or devices and instruments allowing access to materials, which are not authorized by the person giving the test, such as class notes or specifically designed "crib notes" as well as cell phones, to name a few. The presence of textbooks constitutes a violation if they have been specifically prohibited by the person administering the test;
 - using, buying, stealing, transporting, or soliciting in whole or part the contents of an unadministered test, test key, homework solution, or computer program;
 - collaborating with or seeking aid from another student or person during a test or other assignment without explicit authorization;
 - discussing the contents of an examination with another student who will take the examination;
 - divulging the contents of an examination, for the purpose of preserving questions for use by another, or removing material from the exam location, when the instructors has designated that the examination is not to be removed from the examination room or not to be returned or to be kept by the student;
 - substituting for another person, or permitting another person to substitute for oneself to take a course, a test, or any course-related assignment;
 - paying or offering money or other valuable thing to, or coercing another person to obtain an unadministered test, test key, homework solution, or computer program or information about an unadministered test, test key, home solution or computer program;
 - falsifying research data, laboratory reports, and/or other academic work offered for credit;
 - taking, keeping, misplacing, or damaging the property of The University of Texas at Tyler, or of another, if the student knows or reasonably should know that an unfair academic advantage would be gained by such conduct; and
 - misrepresenting facts, including providing false grades or resumes, for the purpose of obtaining an academic or financial benefit or injuring another student academically or financially.
- ii. "Plagiarism" includes, but is not limited to, the appropriation, buying, receiving as a gift, or obtaining by any means another's work and the submission of it as one's own academic work offered for credit.
- iii. "Collusion" includes, but is not limited to, the unauthorized collaboration with another person in preparing academic assignments offered for credit or collaboration with another person to commit a violation of any section of the rules on scholastic dishonesty.

- iv. All written work that is submitted will be subject to review by plagiarism software.
- v. Penalty for any related infractions will be decided at the discretion of the instructor including, but not limited to, granting of a failing grade in part or the course or in the entire course.

Students Rights and Responsibilities

To know and understand the policies that affect your rights and responsibilities as a student at UT Tyler, please follow this link: <http://www.uttyler.edu/wellness/rightsresponsibilities.php>

Important Covid-19 Information for Classrooms and Laboratories

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Campus Carry

We respect the right and privacy of students 21 and over who are duly licensed to carry concealed weapons in this class. License holders are expected to behave responsibly and keep a handgun secure and concealed. More information is available at <http://www.uttyler.edu/about/campus-carry/index.php>

UT Tyler a Tobacco-Free University

All forms of tobacco will not be permitted on the UT Tyler main campus, branch campuses, and any property owned by UT Tyler. This applies to all members of the University community, including students, faculty, staff, University affiliates, contractors, and visitors.

Forms of tobacco not permitted include cigarettes, cigars, pipes, water pipes (hookah), bidis, kreteks, electronic cigarettes, smokeless

tobacco, snuff, chewing tobacco, and all other tobacco products.

There are several cessation programs available to students looking to quit smoking, including counseling, quitlines, and group support.

For more information on cessation programs please visit www.uttlyer.edu/tobacco-free.

Grade Replacement/Forgiveness and Census Date Policies

Students repeating a course for grade forgiveness (grade replacement) must file a Grade Replacement Contract with the Enrollment Services Center (ADM 230) on or before the Census Date of the semester in which the course will be repeated. Grade Replacement Contracts are available in the Enrollment Services Center or at <http://www.uttlyer.edu/registrar>. Each semester's Census Date can be found on the Contract itself, on the Academic Calendar, or in the information pamphlets published each semester by the Office of the Registrar.

Failure to file a Grade Replacement Contract will result in both the original and repeated grade being used to calculate your overall grade point average. Undergraduates are eligible to exercise grade replacement for only three course repeats during their career at UT Tyler; graduates are eligible for two grade replacements. Full policy details are printed on each Grade Replacement Contract.

The Census Date is the deadline for many forms and enrollment actions of which students need to be aware. These include:

- Submitting Grade Replacement Contracts, Transient Forms, requests to withhold directory information, approvals for taking courses as Audit, Pass/Fail or Credit/No Credit.
- Receiving 100% refunds for partial withdrawals. (There is no refund for these after the Census Date)
- Schedule adjustments (section changes, adding a new class, dropping without a "W" grade)
- Being reinstated or re-enrolled in classes after being dropped for non-payment
- Completing the process for tuition exemptions or waivers through Financial Aid

State-Mandated Course Drop Policy

Texas law prohibits a student who began college for the first time in Fall 2007 or thereafter from dropping more than six courses during their entire undergraduate career. This includes courses dropped at another 2-year or 4-year Texas public college or university. For purposes of this rule, a dropped course is any course that is dropped after the census date (See Academic Calendar for the specific date).

Exceptions to the 6-drop rule may be found in the catalog. Petitions for exemptions must be submitted to the Enrollment Services Center and must be accompanied by documentation of the extenuating circumstance. Please contact the Enrollment Services Center if you have any questions.

Disability/Accessibility Services

In accordance with Section 504 of the Rehabilitation Act, Americans with Disabilities Act (ADA) and the ADA Amendments Act (ADAAA) the University of Texas at Tyler offers accommodations to students with learning, physical and/or psychological disabilities. If you have a disability, including a non-visible

diagnosis such as a learning disorder, chronic illness, TBI, PTSD, ADHD, or you have a history of modifications or accommodations in a previous educational environment, you are encouraged to visit <https://hood.accessiblelearning.com/UTTyler> and fill out the New Student application. The Student Accessibility and Resources (SAR) office will contact you when your application has been submitted and an appointment with Cynthia Lowery, Assistant Director of Student Services/ADA Coordinator. For more information, including filling out an application for services, please visit the SAR webpage at <http://www.uttyler.edu/disabilityservices>, the SAR office located in the University Center, # 3150 or call 903.566.7079.

Student Absence due to Religious Observance

Students who anticipate being absent from class due to a religious observance are requested to inform the instructor of such absences by the second class meeting of the semester.

Student Absence for University-Sponsored Events and Activities

If you intend to be absent for a university-sponsored event or activity, you (or the event sponsor) must notify the instructor at least two weeks prior to the date of the planned absence. At that time the instructor will set a date and time when make-up assignments will be completed.

Social Security and FERPA Statement

It is the policy of The University of Texas at Tyler to protect the confidential nature of social security numbers. The University has changed its computer programming so that all students have an identification number. The electronic transmission of grades (e.g., via e-mail) risks violation of the Family Educational Rights and Privacy Act; grades will not be transmitted electronically.

Emergency Exits and Evacuation

Everyone is required to exit the building when a fire alarm goes off. Follow your instructor's directions regarding the appropriate exit. If you require assistance during an evacuation, inform your instructor in the first week of class. Do not re-enter the building unless given permission by University Police, Fire department, or Fire Prevention Services.

UT Tyler Resources for Students

- UT Tyler Writing Center (903.565.5995), writingcenter@uttyler.edu
- UT Tyler Tutoring Center (903.565.5964), tutoring@uttyler.edu
- The Mathematics Learning Center, RBN 4021, this is the open access computer lab for math students, with tutors on duty to assist students who are enrolled in early-career courses.
- UT Tyler Counseling Center (903.566.7254)

Tentative Course Schedule

#	Week of	Lecture Activity
1	Jan. 10	Syllabus + Static Review Chapter 1: Stress
2	Jan. 17	Jan. 17: Martin Luther King, Jr. Holiday - No Classes Chapter 1: Stress
3	Jan. 24	Chapter 2: Strain Chapter 3: Mechanical Properties of Materials
4	Jan. 31	Chapter 3: Mechanical Properties of Materials Chapter 4: Axial Load
5	Feb. 7	Chapter 4: Axial Load Chapter 5: Torsion
6	Feb. 14	Chapter 5: Torsion Chapter 6: Bending
7	Feb. 21	Exam 1
8	Feb. 28	Chapter 6: Bending Chapter 7: Transverse Shear
9	Mar. 7	Spring break – No Classes
10	Mar. 14	Chapter 8: Combined Loadings
11	Mar. 21	Chapter 9: Stress Transformation
12	Mar. 28	Chapter 10: Strain Transformation
13	Apr. 4	Exam 2
14	Apr. 11	Chapter 11: Design of Beams and Shafts
15	Apr. 18	Chapter 12: Deflection of Beams and Shafts Chapter 13: Buckling of Columns
16	Apr. 25	Final Exam Week