

The University of Texas at Tyler
College of Engineering
Course Objectives, Syllabus, and Course Policy
2020 Fall Semester (August 24-December 12)

- COURSE:** MENG 3306.001 – Mechanics of Materials - M W 5:00 to 6:20 pm-scheduled in RBN3040- There are no face-to-face classes in RBN3040. All classes will be taught remotely using Zoom and you can access these classes remotely by Zoom.
- TEXT:** R. C. Hibbeler: Mechanics of Materials, 10th Edition, Pearson, NJ, 2015 (ISBN 9780134319650) **(OR)** any earlier cheaper edition of the same book having the same course contents.
- INSTRUCTOR:** Dr. M. Sathyamoorthy, Office – Engineering RBN3006 – 903 565 5939 – msathyamoorthy@uttyler.edu-- Virtual office hours are posted at the door and in Canvas—You are encouraged to send me emails with your questions and you may also request Zoom sessions with me ahead of time to be scheduled during office hours.

COURSE INFORMATION

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.

ABOUT THE COURSE

Mechanics of Materials is the third of the three-course sequence in Mechanics, (Statics and Dynamics being the other two), that is usually required of most engineering majors. Statics and Dynamics provide an early introduction to basic engineering principles and applications in traditional engineering curricula. Ordinarily, they are included at the beginning of engineering programs/curricula so as to provide an opportunity to find out if the student has the necessary aptitude to succeed in engineering. In-depth understanding of Statics and Dynamics is an absolute necessity for the study of other mechanics courses such as Strength of Materials, Thermodynamics, Fluid Mechanics etc. In order to meet these objectives, this course will be presented with a strong emphasis on understanding the fundamental theoretical concepts complemented by solutions to a number of example problems to reinforce the understanding of the theory discussed in class. Past experience indicates that one of the most effective ways of mastering the course material is to solve as many classroom, practice and homework problems as possible.

PRE-REQUISITES

ENGR2301 or CENG2301-Statics is a prerequisite for this course with a minimum “C” grade.

COURSE SYLLABUS & TOPICS COVERED

The following syllabus describes the course contents. A flexible lecture schedule will be used to adjust the material covered to suit the background, interest and response of the students in order

to maximize the overall benefits.

- Chapter 1: Stress - Sections: 1.1 to 1.6
- Chapter 2: Strain - Sections: 2.1 and 2.2
- Chapter 3: Mechanical Properties of Materials - Sections: 3.1 to 3.6
- Chapter 4: Axial Load - Sections: 4.1 to 4.7

Exam 1 Remotely using Canvas and Zoom on September 23.

- Chapter 5: Torsion - Sections: 5.1 to 5.8
- Chapter 6: Bending - Sections: 6.1 to 6.5, 6.8, 6.9
- Chapter 7: Transverse Shear - Sections: 7.1 to 7.5

Exam 2 Remotely using Canvas and Zoom on October 21.

- Chapter 8: Combined Loadings - Sections: 8.1 and 8.2
- Chapter 9: Stress Transformation - Sections: 9.1 to 9.5
- Chapter 10: Strain Transformation - Sections: 10.1 to 10.7

Exam 3 Remotely using Canvas and Zoom on November 16.

- Chapter 11: Design of Beams and Shafts - Sections: 11.1 to 11.4
- Chapter 12: Deflection of Beams and Shafts - Sections: 12.1, 12.2, 12.4 to 12.9
- Chapter 13: Buckling of Columns - Sections: 13.1 to 13.4

FINAL COMPREHENSIVE EXAMINATION: The date for the 2-hour comprehensive final exam will be announced later. This final exam also will be held remotely during the final exam week.

ASSESSMENT: HOMEWORK:

Homework is considered to be very important to fully understand the course material. Completing your homework is an absolute necessity to do well in this course. Therefore, I strongly urge each of you to complete the homework assignments in a timely manner. Homework assignments and solutions will be posted in Canvas. Homework will **NOT** be collected or graded. You are encouraged to work in groups remotely to solve homework problems and learn from each other.

EXAMS:

Closed-book, closed-notes exams will be given after completing a reasonable amount of material from the text as shown earlier. A final 2-hour **COMPREHENSIVE** examination will be given during the final exam week. All exams will be done remotely using Canvas and Zoom. Access to a computer or laptop, a printer and a scanner is necessary to take all the exams remotely. You may use a one-page, self-written notes (cheat sheet with no problem solutions of any kind) for reference in each of the exams and the final examination. The cheat sheet will be collected with exam papers. A formula sheet will be posted in Canvas before each exam and it will also be included with the exam. If you miss any exam without getting **prior approval from me at least one week before the test date**, your exam score will be counted as zero in the calculation of your final course grade.

FINAL GRADES:

Final grades are based on:

3 Exams @ 20%, 20% and 20%	60%
Final Comprehensive Exam	<u>40%</u>
Total	100%

NOTE

In computing your final course grade, your lowest exam grade (from exam 1, 2 or 3) will be replaced by the final exam grade if you did really well in the final exam. In other words, if your final exam grade is better than any of your earlier exam grades, it will be used to replace the lowest grade and will also be used as your final exam grade. Since final exam is a comprehensive exam this is an incentive for you to do really well in the final exam.

Course syllabus, and all course material will be posted in Canvas. Please review all the material posted in Canvas on a regular basis. I will use Canvas to post announcements and contacting students by e-mail.

CALCULATOR POLICY:

Use your own scientific calculator **TI-30X IIS** or any FE Exam approved calculator at each exam. You are not be allowed to use any other calculator or store any class material in the calculator during the exams. You cannot use i-phones, i-pads, i-watches or other electronic devices during the exams. I strongly recommend that you buy the TI-30X IIS calculator before the classes begin and get familiar with its use before the first examination.

ATTENDANCE:

Regular attendance is required. Attendance will be taken in each Zoom class for my records. 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 on home works, exams etc.

THERE WILL BE NO MAKE-UP EXAMS. The percentage of any exam missed by a student will be added to his/her final comprehensive exam only if prior excuse is granted. Excuses will be given only if you have to miss an exam due to emergencies (such as medical and other emergencies). Please inform me as soon as possible before or immediately after the exam. Class average for each exam will be posted in Canvas after each exam. You can use these class averages to estimate your standing at any time. If the class averages for the 3 exams are a, b, and c, then the overall class average before final exam will be $0.2(a+b+c)$. Compare this with your numbers to see your status. Cut-offs for A, B, C, D, and F will be determined only after the final exam grades are known. If your grade is consistently at or close to the class average you will get a "C" grade. Final course grades will be determined on the basis of the class average. If you miss any exam without getting **prior excuse and approval from me**, it will be counted as zero in the calculation of your final course grade. If you intend to be absent for a university-sponsored event or activity, you (or the event sponsor) must notify me at least a week prior to the date of the planned absence.

University, College, and Department 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.

“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.
- “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.
- “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.
- All written work that is submitted will be subject to review by plagiarism software.
- 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

Students are required to wear face masks covering their nose and mouth, and follow social distancing guidelines, at all times in public settings (including classrooms and laboratories), as specified by [Procedures for Fall 2020 Return to Normal Operations](#). 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, or a higher than normal temperature will be excused from class and should stay at home and may join the class remotely.

Students who have difficulty adhering to the Covid-19 safety policies for health reasons are also encouraged to join the class remotely. 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

Class sessions may be recorded by the instructor 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.

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.uttyler.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.uttyler.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)

COURSE OBJECTIVES: COURSE OBJECTIVES By the end of this course students will be able to:

1. Use external loads including axial force, moment, torque, shear force, forces caused by temperature variation, and constraints to determine internal forces for a variety of structures and structural elements. Relate the internal forces to specific stress components, calculate those stresses and deformations.
2. Determine the state of stress at a point for uni-axial, bi-axial and tri-axial stress configurations and use them to find principal stresses and directions. Also, use the Mohr's circle diagram to analyze biaxial state of stress, and determine the maximum and minimum stresses and directions.

3. Relate stress to strain using material properties, and analyze the state of strain at a point and use strains to calculate deformations. For a variety of external loads, analyze statically determinate structures, and indeterminate structures using compatibility of deformations.
4. Use load-deformation equations and other methods to calculate beam deflections. Analyze and design beams, circular and non-circular shafts and sections as well as other structural members based on strength and deformation requirements. Take into account maximum stresses due to geometric anomalies such as holes and fillets.
5. Use appropriate Theories of Failure to predict ductile or brittle material failure. Use elastic instability and column buckling analysis to design columns.