The University of Texas at Tyler
College of Engineering
Course Objectives, Syllabus, and Course Policy
Spring 2020 (January 13 to May 2)

COURSE: **MENG 3306.001 – MECHANICS OF MATERIALS**
Lectures: Mondays & Wednesdays 9:30 -10:50 am in RBN3039

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-- Office hours posted at the door and in Canvas.

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 in general terms. 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

Review Session 1 will be done in class before Exam 1.
Exam 1 on February 12th in class

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

Review Session 2 will be done in class before Exam 2.

Exam 2 on March 25th in class

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

Review Session 3 will be done in class before Exam 3.

Exam 3 on April 15th in class

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 and will be during the final exam week (the week of April 27th)

ATTENDANCE

Mechanics of Materials is one of the challenging courses in engineering. Regular attendance is imperative if you want to do well in this course. Therefore, regular attendance is highly recommended. 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.

HOMEWORK

Doing homework is very important in understanding the course material. Completing your homework independently is an absolute necessity to do well in this course. Therefore I strongly urge each of you to complete the homework assignments independently. They will, in general, be assigned after lectures on sections that are completed. Homework assignments and solutions will be posted in Canvas. Homework will **NOT** be collected or graded. You are encouraged to work in groups to solve homework problems and learn from each other. Also, use the tutoring center to get help.

EXAMS

Closed-book, closed-notes exams will be given after completing a reasonable amount of material from the text as shown in the syllabus. A final 2-hour COMPREHENSIVE examination will be given during the final exam week. For each of the exams and the final exam, you are allowed to use only one page of self-written notes (cheat sheet with no problem solutions of any kind) which will be collected with the exam papers. A formula sheet will be posted in Canvas before each exam and it will also be included with the exam.

FINAL GRADES:

Final grades are based on:

3 Exams @ 20 points each	60 points
Group project	10 points
Final Comprehensive Exam	30 points
Total	100 points

NOTE:

Course syllabus, course material such as handouts and example problems with solutions,

homework assignments, homework solutions, review material, sample exams & solutions are all posted. 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 You are allowed to use your own scientific calculator TI-30X IIS 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 have i-phones, i-pads, i-watches or other electronic devices with you. If you bring i-phone or other electronic devices to the room, please leave them in your bag. I strongly recommend that you buy the TI-30X IIS calculator (for about $12) and get familiar with its use before the first examination.

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 approval is granted. The student is responsible to contact me at least a week before the scheduled exam date to get an excuse from the exam. 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 announced in class and also posted in Canvas after each exam. Final course grades will be determined on the basis of the class average. If your exam score is consistently at the class average you will get a "C" grade. If you miss any exam without getting **prior approval from me at least a week before the exam date**, the exam grade 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.

MANDATORY TUTORIAL SESSIONS

Whenever your exam score falls below the class average (class average will be announced in class after each exam and also posted in Canvas), you are required to attend at least 5 one-hour tutorial sessions offered by the PASS Tutoring Center prior to the next exam date. You can do this at one session of 5 hours or 5 sessions of 1 hour each depending upon your convenience. This requirement will be strictly enforced. Days and times for tutorial sessions are posted in Canvas. If you do not attend these mandatory tutorial sessions, you are not eligible for grade replacement incentive noted above.

GRADE REPLACEMENT INCENTIVE

Please note that the final exam is a comprehensive exam. 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. Make sure that you attend the mandatory tutorial sessions. If you do not attend these mandatory tutorial sessions, you are not eligible for this grade replacement incentive.

ELECTRONIC DEVICES

Cell phones and all other forms of electronic communication devices, if carried into the classroom, must be turned off. The use of computers and other electronic devices during class is restricted to classroom activities and course applications. Do not record lecture materials without obtaining prior written consent of the instructor.

ACADEMIC DISHONESTY

Academic or scholastic dishonesty includes cheating, plagiarism, collusion and/or falsifying academic records. University policy prohibits these acts and students suspected of academic dishonesty are subject

to disciplinary proceedings. Therefore, no cheating of any kind will be tolerated. If you try to cheat, your course grade will be **"F"** and the incident will be reported to the University.

UT TYLER A TOBACCO-FREE UNIVERSITY

Beginning August 15, 2016, 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.

CONCEALED HANDGUN POLICY

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 .

Academic policies regarding withdrawal from the course, state-mandated course drop rule, grade forgiveness, student rights, absence for religious observance, grade replacement, social security and privacy, learning disability, academic dishonesty and others can be found at https://www.uttyler.edu/wellness/rightsresponsibilities.php. A copy is posted in Canvas for your convenience and some of the policies are reproduced below for your information.

Grade Replacement/Forgiveness

If you are repeating this course for a grade replacement, you must file an intent to receive grade forgiveness with the registrar by the 12th day of class. Failure to do so will result in both the original and repeated grade being used to calculate your overall grade point average. Undergraduates will receive grade forgiveness (grade replacement) for only three course repeats; graduates, for two course repeats during his/her career at UT Tyler.

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 12th day of class (See Schedule of Classes for the specific date).
Exceptions to the 6-drop rule may be found in the catalog. Petitions for exemptions must be submitted to the Registrar's Office and must be accompanied by documentation of the extenuating circumstance. Please contact the Registrar's Office if you have any questions.

Disability Services

If you have a disability, including a learning disability, for which you request disability support services/accommodation(s), please contact Ida MacDonald in the Disability Services office so that the appropriate arrangements may be made. In accordance with federal law, a student requesting disability services/accommodation(s) must provide appropriate documentation of his/her disability to the Disability Services counselor. In order to assure approved services the first week of class, diagnostic, prognostic, and prescriptive information should be received 30 days prior to the beginning of the semester services are requested. For more information, call or visit Disability Services located in the University Center, Room 3150. The telephone number is (903) 566-7079. Additional information may also be obtained at the following UT Tyler Web address: http://www.uttyler.edu/disabilityservices.

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.

For additional information and details about these items, please see SYLLABUS POLICY posted on Canvas and the University Catalog.

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.