Department of Mechanical Engineering
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Uttyler.edu/engineering

# MENG 3306 – Mechanics of Materials
## Course Syllabus

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| Semester / Year | Summer II - 2025 |
| Catalog Description | Stress and strain; uniaxially loaded members; centroids and area moments of inertia; normal and shear stresses; beam deflections; buckling of columns; pressure vessels; combined stresses; failure criteria. Three hours of lecture per week. |
| Prerequisites | Grade C or better in ENGR 2301 Mechanics - Statics |
| Section Number | 461 |
| Instructor Name | Ola Al-Shalash |
| Contact Information | **Office:** Houston Engineering Center: HEC **A212**<br>**E-mail:** oalshalash@uttyler.edu |
| Class Type / Location | **Online**: Asynchronous and synchronous. |
| Class Time | Monday to Friday |
| Office Hours | By appointment |
| No. of Credits | 3 credits |
| Required Textbook | **Mechanics of Materials**, 10th edition, by R. C. Hibbeler with **Modified Mastering Engineering**<br>*If student does not register by **census day**, the student will be dropped from this course!* |
| Optional References | N/A |
| Additional Rules and Requirements | - Handouts and manuals posted on Canvas<br>- Pre-requisite knowledge:<br>• Calculus (integration and differentiation) and Linear Algebra (systems of equations)<br>• Vector Analysis (understanding of vector representations and operations)<br>• Statics (free body diagrams and equilibrium analysis)<br>- AI is permitted only for specific assignments or situations, and appropriate acknowledgment is required. |
| Evaluation Method | Grading:<br>Exam I **25** %<br>Exam II **25** %<br>Final Exam **30** %<br>Homework **20** % |
| Grading Policy / Scale | Letter grades, *scale:*<br>***A**: 90 – 100; **B**: 80 – 89; **C**: 70 – 79; **D**: 60 – 69; **F**: < 60*<br>**Grade appeal**<br>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 |

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| | may appeal any grade reduction to the instructor if valid excuse with documentation is provided. |
| Important Events / Dates | **Census date:** July 10<br>**Last day to withdraw:** July 29<br>**Exam I:** July 22 @ 4:00 pm<br>**Exam II:** Aug. 1 @ 4:00 pm<br>**Final Exam:** Aug. 9 @ 3:00 pm<br>https://www.uttyler.edu/schedule/files/2024-2025/academic-calendar-2024-2025-main-2025-01-10.pdf |
| Attendance / Makeup policy/ other rules | • This is a condensed and intensive course that requires extreme timely action and discipline. Students are expected to invest an average of about 22 hours weekly to gain the best learning of the course. Therefore, deadlines set for any part of the course such as homework submission will be strictly enforced. If a student has a valid, documented, university excuse, they can present it to the instructor and the specified office and that will be handled on a case-by-case basis.<br>• Attendance is only required for the exams during the course.<br>• Lectures and everything regarding the course are posted on Canvas, so make sure to check your course canvas regularly. It is your responsibility to keep up with the class work and be informed of all announcements made on canvas.<br>• No email submission of assignments, HomeWorks, etc. All assignments MUST be submitted to Canvas for grading.<br>• No makeups unless students provide a university accepted excused absence with proper documentation justifying the absence.<br>• Questions involving knowledge covered in class will be answered if the student proves that they have tried to come up with the answer. Solution to homework will not be given. However, students can work on the right solution by checking their work with the instructor.<br>• Student with SAR status should contact the UT Tyler Office of Student Accessibility and Resources for exam arrangements.<br>• 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.<br>• The use of cellular phones during lectures is prohibited. If a student uses the cellular phone (call, text, internet), he/she will be asked to leave the classroom and penalties of missing the class will apply. It is highly recommended to keep your cellular phone off.<br>• No food is allowed in the classroom.<br>• 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. |

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| | • 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.<br>• 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.<br>• 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.<br>• The syllabus is subject to change during the semester as deemed necessary. Students will be notified for any major changes. |
| Course Learning Outcomes / ABET & PEOs relation | By the end of this course, students will be able to:<br>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.<br>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.<br>3. Relate stress to strain using material properties and analyze the state of strain at a point and use strains to calculate deformations.<br>4. Design shafts and beams and use load-deformation equations and other methods to calculate beam deflections. |
| Tentative Topics | • Normal and shear stress<br>• Normal and shear strain<br>• Mechanical properties of materials<br>• Axial load<br>• Torsion<br>• Bending<br>• Stress and strain transformation<br>• Beam and shaft design<br>• Deflections of beams and shafts |
| University Policies | https://www.uttyler.edu/offices/academic-affairs/files/syllabus-information.pdf |
| Evaluation activities | **Exams**<br>• There will be three exams for this course, two exams during the course 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 a 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 into 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.

**Homework Policy**

1. Homework will be assigned for each chapter. The homework problems will be posted on canvas/MyLab and Mastering. You will have three attempts in MyLab and Mastering for each HW. The hard-copy of the homework assignment has to be scanned and submitted to Canvas by the due date. Messy work will not be graded, and a zero grade will be given. Your HW grade will be given based on both the "MyLab and Mastering" and the "scanned submission of the hard-copy" of the HW. If one of these are missing, a zero grade will be given for that HW. The grade you receive in MyLab and Mastering will be your final HW grade, but some bonus points may be awarded for the scanned submission of the HW; thus, make sure you submit a neat and organized solution for all HW problems.
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.
   - 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' solutions as well.

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**Tentative Course Schedule**

| # | Week NO. | Days | Lecture Activity |
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| 1 | Week 1 | July 8 | Syllabus + Static Review; Chapter 1: Stress |
| 2 | | July 9 | Chapter 2: Strain |
| 3 | | July 11 | Chapter 3: Mechanical Properties of Materials |
| 4 | Week 2 | July 15 | Chapter 4: Axial Load |
| 5 | | July 16 | Chapter 5: Torsion |
| 6 | | July 18 | Chapter 6: Bending |
| 7 | Week 3 | July 22 | **Exam I** |
| 8 | | July 23 | Chapter 7: Transverse Shear |
| 9 | | July 25 | Chapter 8: Combined Loadings |
| 10 | Week 4 | July 29 | Chapter 9: Stress Transformation |
| 11 | | July 30 | Chapter 10: Strain Transformation |
| 12 | | Aug. 1 | **Exam II** |
| 13 | Week 5 | Aug. 5 | Chapter 11: Design of Beams and Shafts |
| 14 | | Aug. 6 | Chapter 12: Deflection of Beams and Shafts |
| 15 | | Aug. 9 | **Final Exam** |