UTTyler ENGINEERING

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MENG 3319 – Material Science and Manufacturing
Course Syllabus

Semester / Year	Spring / 2026
Catalog Description	Introduction to materials science including the structure of metals and polymers, the testing of mechanical properties of materials, the relationship between material properties, structure and processing techniques, and the capabilities and limitations of modern manufacturing methods. Two one-hour lectures and one three-hour lab per week.
Prerequisites	CHEM 1311, CHEM 1111, and MENG 1301, all with a grade of "C" or better.
Section Number	Lecture: 030 Lab: 030L
Instructor Name	Dr. Hussain Rizvi
Contact Information	Email: hrizvi@uttyler.edu Office: HEC A206
Class Type / Instruction Mode / Location	Face-to-face 030: HEC A218 030L: HEC B223
Class Time	030: MW 11:00 AM –12:20 PM 030L: F 11:00 AM –1:45 PM
Office Hours	Mo 9:30-11:00 am, Tue 11:00 –12:30 pm, or by appointment outside of the regular office hours.
No. of Credits	3 credits
Required Textbook	Materials Science and Engineering: An Introduction, William D. Callister and David G. Rethwisch, 10th Edition, 2018, ISBN# 9781119405498
Optional References	Lecture notes on Canvas
Additional Rules and Requirements	Since the mechanical engineering program is designed to prepare students for professional practice, all submitted work (e.g., homework, lab reports, projects, presentations) is expected to meet professional standards. Work that does not reflect professional quality may be subject to grade reductions, even if professionalism is not explicitly listed in the grading rubric. This course allows the use of AI tools (such as ChatGPT, Copilot, Gemini, etc.) only in lab report writing. Students will be notified as to when these tools should be used, along with guidance on how to use them. Using AI tools outside of these parameters violates UT Tyler's Honor Code, constitutes plagiarism, and will be treated as such.
Evaluation Method	Attendance/Quiz: 5%; Homework: 20%; Exams: 30%; Lab Reports: 30%; Final Exam: 15%
Grading Policy / Scale	Letter grades, scale: A: 90 – 100; B: 80 – 89; C: 70 – 79; D: 60 – 69; F: < 60
Important Events / Dates	Census date: 01/26/26 (Mo) Midterm-01: 02/11/26 (Wed) Midterm-02: 03/25/26 (Wed)

<table>
<tr><td></td><td>Last date to withdraw from one or more 15-week courses: 3/30/26
Final date: 4/27/26 (Mon) Time: 10:15 am – 12:15 am</td></tr>
<tr><td>Attendance / Makeup policy / other rules</td><td>1. Lecture attendance will be checked using Canvas quiz function.
2. Lab attendance is mandatory.
3. No make-up exam(s).
4. All assignments MUST be submitted to Canvas for grading.
5. Student with SAR status should contact the UT Tyler Office of Student Accessibility and Resources for exam arrangements.</td></tr>
<tr><td>Course Learning Objectives / ABET & PEOs Relation</td><td>By the end of this course, students will be able to:
1. Explain atomic structure, crystal structures, and types of defects in metals.
2. Describe common processing techniques through strain hardening, diffusion, and solution hardening of metal alloys.
3. Describe common structures, properties, processing methods, and applications of polymer and ceramics.
4. Perform mechanical testing and metallographic procedures to report material properties and microstructures of various metal alloys in laboratory reports.</td></tr>
<tr><td>Tentative Topics / Course Plans</td><td>Atomic Structure and Bonding; Structure of Crystalline Solids; Imperfection in Solids; Mechanical Properties of Materials; Diffusion; Dislocation and Strengthening; Phase Diagrams; Processing of Metal Alloys; Polymers and Ceramics; Processing of Polymers and Ceramics.

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<tr><th>Week (Dates)</th><th>Topic</th><th></th></tr>
<tr><td>1(1/12, 1/14)</td><td>(Mo) Syllabus</td><td>(Wed) Ch1: Introduction</td></tr>
<tr><td>2(1/19, 1/21)</td><td>(Mo) MLK day (No Class)</td><td>(Wed) Ch2: Atomic Structure</td></tr>
<tr><td>3(1/26, 1/28)</td><td>(Mo) Ch2: Interatomic Bonding</td><td>(Wed) Ch3: Unit Cells</td></tr>
<tr><td>4(2/2, 2/4)</td><td>(Mo) Ch3: Crystal Systems</td><td>(Wed) Ch4: Imperfections</td></tr>
<tr><td>5(2/9, 2/11)</td><td>(Mo) Ch5: Diffusion</td><td>(Wed) 1st Midterm</td></tr>
<tr><td>6(2/16, 2/18)</td><td>(Mo) Ch6: Mechanical Properties</td><td>(Wed) Ch6: Mechanical Properties</td></tr>
<tr><td>7(2/23, 2/25)</td><td>(Mo) Ch7: Dislocation</td><td>(Wed) Ch7: Strengthening</td></tr>
<tr><td>8(3/2, 3/4)</td><td>(Mo) Ch8: Failure</td><td>(Wed) Ch9: Phase Diagram</td></tr>
<tr><td>9(3/9, 3/11)</td><td colspan="2">Spring Break</td></tr>
<tr><td>10(3/16, 3/19)</td><td>(Mo) Ch9: Phase Diagram</td><td>(Wed) Ch10: Phase Transformation</td></tr>
<tr><td>11(3/23, 3/25)</td><td>(Mo) Review</td><td>(Wed) 2nd Midterm</td></tr>
<tr><td>12(3/30, 4/1)</td><td>(Mo) Ch11: Forming/Casting</td><td>(Wed) Ch11: Heat Treatment</td></tr>
<tr><td>13(4/6, 4/8)</td><td>(Mo) Ch12: Ceramics</td><td>(Wed) Ch13: Ceramic Processing</td></tr>
<tr><td>14(4/13, 4/15)</td><td>(Mo) Ch14: Polymers</td><td>(Wed) Ch15: Polymer Processing</td></tr>
<tr><td>15(4/20, 4/22)</td><td>(Mo) Biomaterials</td><td>(Wed) Review</td></tr>
<tr><td>16(4/27)</td><td>Final</td><td></td></tr>
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(Dr. Rizvi reserves the right to change schedule in course plan)</td></tr>
<tr><td>University Policies</td><td>https://www.uttyler.edu/offices/academic-affairs/files/syllabus-information-rev122025.pdf</td></tr>
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