



MENG 3319 – Materials Science and Manufacturing
Course Syllabus

Semester / Year	Spring 2025
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	C or better in CHEM 1311 and CHEM 1111 or equivalent, MENG 1301 or completion of a Computer Aided Drafting course.
Section Number	001 and 001L
Instructor Name	Dr. Shih-Feng Chou
Contact Information	3900 University Blvd., RBN 3005, Tyler TX. 75799 Phone: 903-566-6209 Email: schou@uttyler.edu
Class Type / Instruction Mode / Location	001: Lecture / f-2-f / RBN 3039 001L: Lab / f-2-f / RBN 2011 / RBN 1024
Class Time	001: MoWe 11:15 AM – 12:20 PM 001L: Fr 8:00 AM – 10:45 AM
Office Hours	Mo/We 10 – 11 AM and Th 2 – 3 PM or by appointment. Zoom: 840-9716-1632 (#957516)
No. of Credits	3
Required Textbook	Materials Science and Engineering: An Introduction, William D. Callister and David G. Rethwisch, 10 th Edition, 2018, ISBN# 9781119405498
Optional References	Lecture notes on Canvas.
Additional Rules and Requirements	This course allows the use AI tools (such as ChatGPT and Copilot) only in lab report writing. Students will be notified as to when and how these tools will be used, along with guidance for attribution. Using AI tools outside of these parameters violates UT Tyler’s Honor Code, constitutes plagiarism, and will be treated as such.
Evaluation Method	Attendance: 5%; Homework: 25%; Exams: 20%; Lab Reports: 30%; Final Exam: 20%



Grading Policy / Scale	Letter grades, scale: A: 90 – 100, B: 80 – 89, C: 70 – 79, D: 60 – 69, F: < 60																																																			
Important Events / Dates	1/27/2025 (Mo): Census Date. 2/12/2025 (We): 1 st Exam. 3/26/2025 (We): 2 nd Exam. 3/31/2025 (Mo): Last day to withdraw from one or more classes. 4/28/2025 (Mo): Final Exam.																																																			
Attendance / Makeup policy / other rules	<ol style="list-style-type: none"> Lecture attendance will be recorded using sign-in sheets. Lab attendance is required unless approved by the Instructor. Make-up assignment(s) and exam(s) require instructor's approval prior to the event. All assignments must be submitted to Canvas for grading. Students with SAR status should contact the UT Tyler Office of Student for accommodations. 																																																			
Course Learning Objectives / ABET & PEOs Relation	By the end of this course, students will be able to: <ol style="list-style-type: none"> Explain atomic structure, crystal structures, and types of defects in metals. Describe common processing techniques through strain hardening, diffusion, and solution hardening of metal alloys. Describe common structures, properties, processing methods, and applications of polymer and ceramics. Perform mechanical testing and metallographic procedures to report material properties and microstructures of various metal alloys in laboratory reports. 																																																			
Tentative Topics / Course Plans	<p>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.</p> <p>Course Plan: Course Plan: Two one-hour lectures per week.</p> <table border="1"> <thead> <tr> <th>Week (Date)</th> <th>Topics</th> <th></th> </tr> </thead> <tbody> <tr> <td>1 (1/13, 1/15)</td> <td>(Mo) Syllabus</td> <td>(We) Ch1: Introduction</td> </tr> <tr> <td>2 (1/20, 1/22)</td> <td>(Mo) Martin Luther King, Jr. Holiday</td> <td>(We) Ch2: Atomic Structure</td> </tr> <tr> <td>3 (1/27, 1/29)</td> <td>(Mo) Ch2: Interatomic Bonding</td> <td>(We) Ch3: Unit Cells</td> </tr> <tr> <td>4 (2/3, 2/5)</td> <td>(Mo) Ch3: Crystal Systems</td> <td>(We) Ch4: Imperfections</td> </tr> <tr> <td>5 (2/10, 2/12)</td> <td>(Mo) Problem & Review</td> <td>(We) 1st Midterm (Wk.1 – Wk.5)</td> </tr> <tr> <td>6 (2/17, 2/19)</td> <td>(Mo) Ch6: Mechanical Properties</td> <td>(We) Ch6: Mechanical Properties</td> </tr> <tr> <td>7 (2/24, 2/26)</td> <td>(Mo) Ch5: Diffusion</td> <td>(We) Ch7: Dislocation</td> </tr> <tr> <td>8 (3/3, 3/5)</td> <td>(Mo) Ch7: Strengthening</td> <td>(We) Ch8: Failure</td> </tr> <tr> <td>9 (3/10, 3/12)</td> <td>(Mo) Ch9: Phase Diagram</td> <td>(We) Ch9: Phase Diagram</td> </tr> <tr> <td>10 (3/17, 3/19)</td> <td>Spring Break – No Class</td> <td></td> </tr> <tr> <td>11 (3/24, 3/26)</td> <td>(Mo) Problem & Review</td> <td>(We) 2nd Midterm (Wk.6 – Wk.11)</td> </tr> <tr> <td>12 (3/31, 4/2)</td> <td>(Mo) Ch10: Phase Transformation</td> <td>(We) Ch11: Alloys and Manufacturing</td> </tr> <tr> <td>13 (4/7, 4/9)</td> <td>(Mo) Ch12: Ceramics</td> <td>(We) Ch13: Ceramic Processing</td> </tr> <tr> <td>14 (4/14, 4/16)</td> <td>(Mo) Ch14: Polymers</td> <td>(We) Ch15: Polymer Processing</td> </tr> <tr> <td>15 (4/21, 4/23)</td> <td>(Mo) Problem & Review</td> <td>(We) Problem & Review</td> </tr> <tr> <td>16 (4/28)</td> <td>Final Exam (Wk.1 to Wk.15)</td> <td></td> </tr> </tbody> </table> <p>(Dr. Chou reserves the right to change schedule in course plan.)</p>	Week (Date)	Topics		1 (1/13, 1/15)	(Mo) Syllabus	(We) Ch1: Introduction	2 (1/20, 1/22)	(Mo) Martin Luther King, Jr. Holiday	(We) Ch2: Atomic Structure	3 (1/27, 1/29)	(Mo) Ch2: Interatomic Bonding	(We) Ch3: Unit Cells	4 (2/3, 2/5)	(Mo) Ch3: Crystal Systems	(We) Ch4: Imperfections	5 (2/10, 2/12)	(Mo) Problem & Review	(We) 1st Midterm (Wk.1 – Wk.5)	6 (2/17, 2/19)	(Mo) Ch6: Mechanical Properties	(We) Ch6: Mechanical Properties	7 (2/24, 2/26)	(Mo) Ch5: Diffusion	(We) Ch7: Dislocation	8 (3/3, 3/5)	(Mo) Ch7: Strengthening	(We) Ch8: Failure	9 (3/10, 3/12)	(Mo) Ch9: Phase Diagram	(We) Ch9: Phase Diagram	10 (3/17, 3/19)	Spring Break – No Class		11 (3/24, 3/26)	(Mo) Problem & Review	(We) 2nd Midterm (Wk.6 – Wk.11)	12 (3/31, 4/2)	(Mo) Ch10: Phase Transformation	(We) Ch11: Alloys and Manufacturing	13 (4/7, 4/9)	(Mo) Ch12: Ceramics	(We) Ch13: Ceramic Processing	14 (4/14, 4/16)	(Mo) Ch14: Polymers	(We) Ch15: Polymer Processing	15 (4/21, 4/23)	(Mo) Problem & Review	(We) Problem & Review	16 (4/28)	Final Exam (Wk.1 to Wk.15)	
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