

**MENG 3319 – Materials Science and Manufacturing**  
**Course Syllabus**

<b>Semester / Year</b>	Fall / 2024
<b>Catalog Description</b>	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.
<b>Prerequisites</b>	C or better in CHEM 1311 and CHEM 1111 or equivalent, MENG 1301 or completion of a Computer Aided Drafting course.
<b>Section Number</b>	001, 001L, 002L
<b>Instructor Name</b>	Dr. Shih-Feng Chou
<b>Contact Information</b>	3900 University Blvd., RBN 3005, Tyler TX. 75799 Phone: 903-566-6209 Email: <a href="mailto:schou@uttyler.edu">schou@uttyler.edu</a>
<b>Class Type / Instruction Mode / Location</b>	001: f-2-f / RBN 2007 001L: f-2-f / RBN 1024 002L: f-2-f / RBN 1024
<b>Class Time</b>	001: MoWe 9:05 AM – 10:00 AM 001L: Mo 2:00 PM – 4:45 PM 002L: We 2:00 PM – 4:45 PM
<b>Office Hours</b>	MoWe 10:00 AM – 11:00 AM and Th 3:30 PM – 4:30 PM or by appointment. (Zoom: 842-1003-2901 #928234)
<b>No. of Credits</b>	3
<b>Required Textbook</b>	Materials Science and Engineering: An Introduction, William D. Callister and David G. Rethwisch, 10 <sup>th</sup> Edition, 2018, ISBN# 9781119405498
<b>Optional References</b>	Lecture notes on Canvas.
<b>Additional Rules and Requirements</b>	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.
<b>Evaluation Method</b>	Attendance: 5%; Homework: 25%; Exams: 20%; Lab Reports: 30%; Final Exam: 20%



<b>Grading Policy / Scale</b>	Letter grades, scale: A: 90 – 100, B: 80 – 89, C: 70 – 79, D: 60 – 69, F: < 60																																		
<b>Important Events / Dates</b>	9/9/2024 (Mo): Census Date. 9/25/2024 (We): 1 <sup>st</sup> Exam. 10/30/2024 (We): 2 <sup>nd</sup> Exam. 11/4/2024 (Mo): Last day to withdraw from one or more classes. 12/9/2024 (Mo): Final Exam.																																		
<b>Attendance / Makeup policy / other rules</b>	<ol style="list-style-type: none"> <li>Lecture attendance will be recorded using sign-in sheets.</li> <li>Lab attendance is mandatory.</li> <li>Make-up assignment(s) and exam(s) require instructor’s approval prior to the event.</li> <li>All assignments must be submitted to Canvas for grading.</li> <li>Students with SAR status should contact the UT Tyler Office of Student for accommodations.</li> </ol>																																		
<b>Course Learning Objectives / ABET &amp; PEOs Relation</b>	<p>By the end of this course, students will be able to:</p> <ol style="list-style-type: none"> <li>Explain atomic structure, crystal structures, and types of defects in metals.</li> <li>Describe common processing techniques through strain hardening, diffusion, and solution hardening of metal alloys.</li> <li>Describe common structures, properties, processing methods, and applications of polymer and ceramics.</li> <li>Perform mechanical testing and metallographic procedures to report material properties and microstructures of various metal alloys in laboratory reports.</li> </ol>																																		
<b>Tentative Topics / Course Plans</b>	<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><b>Course Plan:</b> Two one-hour lectures per week.</p> <table border="1"> <thead> <tr> <th>Week (Date)</th> <th>Topics</th> </tr> </thead> <tbody> <tr> <td>1 (8/26, 8/28)</td> <td>(Mo) Syllabus (We) Ch1: Introduction</td> </tr> <tr> <td>2 (9/2, 9/4)</td> <td><b>(Mo) Labor Day – No Class</b> (We) Ch2: Atomic Structure</td> </tr> <tr> <td>3 (9/9, 9/11)</td> <td>(Mo) Ch2: Interatomic Bonding (We) Ch3: Unit Cells</td> </tr> <tr> <td>4 (9/16, 9/18)</td> <td>(Mo) Ch3: Crystal Systems (We) Ch4: Imperfections</td> </tr> <tr> <td>5 (9/23, 9/25)</td> <td>(Mo) <b>Problem &amp; Review</b> (We) <b>1<sup>st</sup> Midterm (Wk.1 – Wk.5)</b></td> </tr> <tr> <td>6 (9/30, 10/2)</td> <td>(Mo) Ch5: Diffusion (We) Ch6: Mechanical Properties</td> </tr> <tr> <td>7 (10/7, 10/9)</td> <td>(Mo) Ch6: Mechanical Properties (We) Ch7: Dislocation</td> </tr> <tr> <td>8 (10/14, 10/16)</td> <td>(Mo) Ch7: Strengthening (We) Ch8: Failure</td> </tr> <tr> <td>9 (10/21, 10/23)</td> <td>(Mo) Ch9: Phase Diagram (We) Ch9: Phase Diagram</td> </tr> <tr> <td>10 (10/28, 10/30)</td> <td>(Mo) <b>Problem &amp; Review</b> (We) <b>2<sup>nd</sup> Midterm (Wk.6 – Wk.10)</b></td> </tr> <tr> <td>11 (11/4, 11/6)</td> <td>(Mo) Ch10: Phase Transformation (We) Ch11: Alloys and Manufacturing</td> </tr> <tr> <td>12 (11/11, 11/13)</td> <td>(Mo) Ch12: Ceramics (We) Ch13: Ceramic Processing</td> </tr> <tr> <td>13 (11/18, 11/20)</td> <td>(Mo) Ch14: Polymers (We) Ch15: Polymer Processing</td> </tr> <tr> <td>14 (11/25, 11/27)</td> <td><b>Thanksgiving Break – No Class</b></td> </tr> <tr> <td>15 (12/2, 12/4)</td> <td>(Mo) <b>Problem &amp; Review</b> (We) <b>Problem &amp; Review</b></td> </tr> <tr> <td>16 (12/9)</td> <td><b>(Mo) Final Exam (Wk.1 to Wk.15)</b></td> </tr> </tbody> </table> <p>(Dr. Chou reserves the right to change schedule in course plan.)</p>	Week (Date)	Topics	1 (8/26, 8/28)	(Mo) Syllabus (We) Ch1: Introduction	2 (9/2, 9/4)	<b>(Mo) Labor Day – No Class</b> (We) Ch2: Atomic Structure	3 (9/9, 9/11)	(Mo) Ch2: Interatomic Bonding (We) Ch3: Unit Cells	4 (9/16, 9/18)	(Mo) Ch3: Crystal Systems (We) Ch4: Imperfections	5 (9/23, 9/25)	(Mo) <b>Problem &amp; Review</b> (We) <b>1<sup>st</sup> Midterm (Wk.1 – Wk.5)</b>	6 (9/30, 10/2)	(Mo) Ch5: Diffusion (We) Ch6: Mechanical Properties	7 (10/7, 10/9)	(Mo) Ch6: Mechanical Properties (We) Ch7: Dislocation	8 (10/14, 10/16)	(Mo) Ch7: Strengthening (We) Ch8: Failure	9 (10/21, 10/23)	(Mo) Ch9: Phase Diagram (We) Ch9: Phase Diagram	10 (10/28, 10/30)	(Mo) <b>Problem &amp; Review</b> (We) <b>2<sup>nd</sup> Midterm (Wk.6 – Wk.10)</b>	11 (11/4, 11/6)	(Mo) Ch10: Phase Transformation (We) Ch11: Alloys and Manufacturing	12 (11/11, 11/13)	(Mo) Ch12: Ceramics (We) Ch13: Ceramic Processing	13 (11/18, 11/20)	(Mo) Ch14: Polymers (We) Ch15: Polymer Processing	14 (11/25, 11/27)	<b>Thanksgiving Break – No Class</b>	15 (12/2, 12/4)	(Mo) <b>Problem &amp; Review</b> (We) <b>Problem &amp; Review</b>	16 (12/9)	<b>(Mo) Final Exam (Wk.1 to Wk.15)</b>
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<b>Lab Plan:</b> One three-hour lab per week.		
Week (Date)	Topics	Assignments
1 (8/26, 8/28)	Lab1: Introduction, Lab Safety, and Lab 2: Report Writing	
2 (9/2, 9/4)	<b>Labor Day – No Lab</b>	
3 (9/9, 9/11)	Lab3: Atomic Structures	Short Report
4 (9/16, 9/18)	Lab4: Metrology, Microscopy, and Grain Size	Short Report
5 (9/23, 9/25)	<b>Midterm, No Lab</b>	
6 (9/30, 10/2)	Lab5: Tensile Test	
7 (10/7, 10/9)	Lab6: Data Analysis	Short Report
8 (10/14, 10/16)	Lab7: Strain Hardening (Rolling) and Hardness Test	
9 (10/21, 10/23)	Lab8: Metallography	Full Report
10 (10/28, 10/30)	<b>Midterm, No Lab</b>	
11 (11/4, 11/6)	Lab9: Heat Treatment of Aluminum Alloys	
12 (11/11, 11/13)	Lab10: Metallography	Full Report
13 (11/18, 11/20)	Lab11: Charpy Impact Test	Full Report
14 (11/25, 11/27)	<b>Thanksgiving Break – No Class</b>	
15 (12/2, 12/4)	Lab12: Manufacturing	
16 (12/9, 12/11)	<b>Final Exam, No Lab</b>	
(Short reports are individual reports, and full reports are group reports.) (Dr. Chou reserves the right to change schedule in lab plan.)		
<b>University Policies</b>	<a href="https://www.uttlyer.edu/offices/academic-affairs/files/syllabus-information.pdf">https://www.uttlyer.edu/offices/academic-affairs/files/syllabus-information.pdf</a>	