

MENG 3319 – Materials Science and Manufacturing
Course Syllabus

Semester / Year	Fall / 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	C or better in CHEM 1311 and CHEM 1111 or equivalent, MENG 1301 or completion of a Computer Aided Drafting course
Section Number	030, 031L
Instructor Name	Dr. Hussain Rizvi
Contact Information	Email: hrizvi@uttyler.edu Office: HEC A206
Class Type / Instruction Mode / Location	Face-to-face 030: HEC C204 031L: HEC B223
Class Time	030: MF 11:15 AM – 12:10 PM 031L: Th 2:00 PM – 4:45 PM 033L: Fr 3:00 PM – 5:45 PM
Office Hours	MF 9:00 am -10:30 am, or by appointment outside of the regular office hours.
No. of Credits	3 credits
Required Textbook	1. Materials Science and Engineering by Joshua P. Steimel 2. Dissemination of IT for the Promotion of Materials Science (DoITPoMS)
Optional References	Materials Science and Engineering: An Introduction, William D. Callister and David G. Rethwisch.
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. Students can use AI programs (ChatGPT, Copilot, etc.) in this course. If you utilize an AI tool to help create content for an assignment, you must acknowledge and cite the tool's contribution to your work.
Evaluation Method	Quizzes: 5%; Homework: 20%; Exams: 25%; 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	Census date: 09/08/26 (Tu) Midterm 1: 09/25/26 (F) (<i>tentative</i>) Midterm 2: 10/30/26 (F) (<i>tentative</i>) Last date to withdraw from one or more courses: 10/30/26 Final date: 12/07/26 (M) Time: 10:15 am – 12:15 pm Academic Calendar: https://www.uttyler.edu/academics/academic-calendar-26-27/																																		
Attendance / Makeup policy / other rules	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.																																		
Course Learning Objectives / ABET & PEOs Relation	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.																																		
Tentative Topics / Course Plans	<table border="1"> <thead> <tr> <th>Week</th><th>Topic</th></tr> </thead> <tbody> <tr> <td>1</td><td>(M) Syllabus (F) Introduction</td></tr> <tr> <td>2</td><td>(M) Atomic Structure (F) Interatomic Bonding</td></tr> <tr> <td>3</td><td>(M) Unit Cells (F) Unit Cells</td></tr> <tr> <td>4</td><td>(M) Crystal Systems (F) Imperfections</td></tr> <tr> <td>5</td><td>(M) Diffusion (F) 1st Midterm</td></tr> <tr> <td>6</td><td>(M) Mechanical Properties (F) Mechanical Properties</td></tr> <tr> <td>7</td><td>(M) Dislocation (F) Strengthening</td></tr> <tr> <td>8</td><td>(M) Failure (F) Phase Diagram</td></tr> <tr> <td>9</td><td>(M) Phase Diagram (F) Phase Transformation</td></tr> <tr> <td>10</td><td>(M) Review (F) 2nd Midterm</td></tr> <tr> <td>11</td><td>(M) Forming/Casting (F) Heat Treatment</td></tr> <tr> <td>12</td><td>(M) Ceramics (F) Ceramic Processing</td></tr> <tr> <td>13</td><td>(M) Polymers (F) Polymer Processing</td></tr> <tr> <td>14</td><td>Thanksgiving – No Class</td></tr> <tr> <td>15</td><td>(M) Biomaterials (F) Review</td></tr> <tr> <td>16</td><td>Final (tentative upon UT Tyler's final exam announcement)</td></tr> </tbody> </table> (Dr. Rizvi reserve the right to change schedule in course plan)	Week	Topic	1	(M) Syllabus (F) Introduction	2	(M) Atomic Structure (F) Interatomic Bonding	3	(M) Unit Cells (F) Unit Cells	4	(M) Crystal Systems (F) Imperfections	5	(M) Diffusion (F) 1st Midterm	6	(M) Mechanical Properties (F) Mechanical Properties	7	(M) Dislocation (F) Strengthening	8	(M) Failure (F) Phase Diagram	9	(M) Phase Diagram (F) Phase Transformation	10	(M) Review (F) 2nd Midterm	11	(M) Forming/Casting (F) Heat Treatment	12	(M) Ceramics (F) Ceramic Processing	13	(M) Polymers (F) Polymer Processing	14	Thanksgiving – No Class	15	(M) Biomaterials (F) Review	16	Final (tentative upon UT Tyler's final exam announcement)
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