

MENG 3319 – Materials Science and Manufacturing
Course Syllabus

Semester / Year	Fall / 2022
Catalog Description	Introduction to materials science including the microstructure of metals, ceramics, and polymers, the materials properties by mechanical testing, the relationship between processing techniques on microstructure and material properties, and the materials manufacturing methods. Two hours of lecture and three hours of 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, 001L, 002L
Instructor	Dr. Shih-Feng Chou
Contact info	3900 University Blvd., RBN 3005, Tyler TX. 75799 Phone: 903-566-6209 Email: schou@uttyler.edu
Class Type / Location	001: RBN 4025 001L: RBN 3038; 002L: RBN 3039
Class Time Lab Time	001: MoWe 8:00 – 8:55 AM 001L: Tu 5:30 – 8:15 PM; 002L: Th 2:00 PM – 4:45 PM
Office Hours	MoWe 10 – 11 AM, Th 11 AM – 12 PM, or by appointment.
Credits	3
Required Textbook	Materials Science and Engineering: An Introduction, William D. Callister and David G. Rethwisch, 10th Edition, 2018, ISBN# 9781119405498
Optional References	Class Handout
Additional requirements	N/A
Evaluation Method	Homework: 20%; Exams: 30%; Lab Reports: 20%; Final Exam: 30%
Grading Policy / Scale	Letter grades, scale: A: 90 – 100; B: 80 – 89; C: 70 – 79; D: 60 – 69; F: < 60

Important events / dates	9/2/2022 (Fr): Census Date 9/21/2022 (We): 1 st midterm 10/26/2022 (We): 2 nd midterm 11/4/2022 (Fr): Last day to withdraw from one or more classes TBD: Final exam																																																			
Attendance / Makeup policy	1. Lecture attendance will be recorded using sign-in sheets. 2. Lab attendance is mandatory. 3. No make-up assignment(s) and 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	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	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																																																			
Other	<p>Tentative Course Schedule:</p> <p>Course Plan: Two one-hour lectures on both Mondays and Wednesdays.</p> <table border="1"> <thead> <tr> <th>Week (Date)</th> <th>Topic</th> <th></th> </tr> </thead> <tbody> <tr> <td>1 (8/22, 8/24)</td> <td>(Mo) Syllabus</td> <td>(We) Ch1: Introduction</td> </tr> <tr> <td>2 (8/29, 8/31)</td> <td>(Mo) Ch2: Atomic Structure</td> <td>(We) Ch2: Interatomic Bonding</td> </tr> <tr> <td>3 (9/5, 9/7)</td> <td>(Mo) Labor Day – No Class</td> <td>(We) Ch3: Unit Cells</td> </tr> <tr> <td>4 (9/12, 9/14)</td> <td>(Mo) Ch3: Crystal Systems</td> <td>(We) Ch4: Imperfections</td> </tr> <tr> <td>5 (9/19, 9/21)</td> <td>(Mo) Problem & Review</td> <td>(We) 1st Midterm (Wk.1 – Wk.5)</td> </tr> <tr> <td>6 (9/26, 9/28)</td> <td>(Mo) Ch6: Mechanical Properties</td> <td>(We) Ch6: Mechanical Properties</td> </tr> <tr> <td>7 (10/3, 10/5)</td> <td>(Mo) Ch5: Diffusion</td> <td>(We) Ch7: Dislocation</td> </tr> <tr> <td>8 (10/10, 10/12)</td> <td>(Mo) Ch7: Strengthening</td> <td>(We) Ch8: Failure</td> </tr> <tr> <td>9 (10/17, 10/19)</td> <td>(Mo) Ch9: Phase Diagram</td> <td>(We) Ch9: Phase Diagram</td> </tr> <tr> <td>10 (10/24, 10/26)</td> <td>(Mo) Problem & Review</td> <td>(We) 2nd Midterm (Wk.6 – Wk.10)</td> </tr> <tr> <td>11 (10/31, 11/2)</td> <td>(Mo) Ch10: Phase Transformation</td> <td>(We) Ch11: Forming/Casting</td> </tr> <tr> <td>12 (11/7, 11/9)</td> <td>(Mo) Ch12: Ceramics</td> <td>(We) Ch13: Ceramic Processing</td> </tr> <tr> <td>13 (11/14, 11/16)</td> <td>(Mo) Ch14: Polymers</td> <td>(We) Ch15: Polymer Processing</td> </tr> <tr> <td>14 (11/21, 11/23)</td> <td>Thanksgiving Break – No Class</td> <td></td> </tr> <tr> <td>15 (11/28, 11/30)</td> <td>(Mo) Biomaterials</td> <td>(We) Problem & Review</td> </tr> <tr> <td>16 (12/5, 12/7)</td> <td>Final Exam (TBD, covers 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)	Topic		1 (8/22, 8/24)	(Mo) Syllabus	(We) Ch1: Introduction	2 (8/29, 8/31)	(Mo) Ch2: Atomic Structure	(We) Ch2: Interatomic Bonding	3 (9/5, 9/7)	(Mo) Labor Day – No Class	(We) Ch3: Unit Cells	4 (9/12, 9/14)	(Mo) Ch3: Crystal Systems	(We) Ch4: Imperfections	5 (9/19, 9/21)	(Mo) Problem & Review	(We) 1st Midterm (Wk.1 – Wk.5)	6 (9/26, 9/28)	(Mo) Ch6: Mechanical Properties	(We) Ch6: Mechanical Properties	7 (10/3, 10/5)	(Mo) Ch5: Diffusion	(We) Ch7: Dislocation	8 (10/10, 10/12)	(Mo) Ch7: Strengthening	(We) Ch8: Failure	9 (10/17, 10/19)	(Mo) Ch9: Phase Diagram	(We) Ch9: Phase Diagram	10 (10/24, 10/26)	(Mo) Problem & Review	(We) 2nd Midterm (Wk.6 – Wk.10)	11 (10/31, 11/2)	(Mo) Ch10: Phase Transformation	(We) Ch11: Forming/Casting	12 (11/7, 11/9)	(Mo) Ch12: Ceramics	(We) Ch13: Ceramic Processing	13 (11/14, 11/16)	(Mo) Ch14: Polymers	(We) Ch15: Polymer Processing	14 (11/21, 11/23)	Thanksgiving Break – No Class		15 (11/28, 11/30)	(Mo) Biomaterials	(We) Problem & Review	16 (12/5, 12/7)	Final Exam (TBD, covers Wk.1 to Wk.15)	
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Lab Plan: One three-hour lab on either Tuesdays or Thursdays.		
Week (Date)	Topic	Reports
1 (8/23, 8/25)	Lab1: Introduction and Lab Safety	
2 (8/30, 9/1)	Lab2: Report Writing Exercises	Short Report
3 (9/6, 9/8)	Lab3: Atomic Structures	Short Report
4 (9/13, 9/15)	Lab4: Metrology, Microscopy, and Grain Size	Short Report
5 (9/20, 9/22)	Midterm, No Lab	
6 (9/27, 9/29)	Lab5-1: Tensile Test	
7 (10/4, 10/6)	Lab5-2: Metallography	Full Report
8 (10/11, 10/13)	Lab6-1: Strain Hardening (Rolling) Hardness Test	
9 (10/18, 10/20)	Lab6-2: Metallography	Full Report
10 (10/25, 10/27)	Midterm, No Lab	
11 (11/1, 11/3)	Lab7-1: Heat Treatment of Aluminum Alloys	
12 (11/8, 11/10)	Lab7-2: Metallography	Full Report
13 (11/15, 11/17)	Lab8: Charpy Impact Test	Full Report
14 (11/22, 11/24)	Thanksgiving Break, No Lab	
15 (11/29, 12/1)	Lab9: Manufacturing	
16 (12/6, 12/8)	Final Exam, No Lab	

(Short reports are individual reports, and full reports are group reports.)
 (Dr. Chou reserves the right to change schedule in lab plan.)

University Policies:

1. UT Tyler Honor Code

Every member of the UT Tyler community joins together to embrace: Honor and integrity that will not allow me to lie, cheat, or steal, nor to accept the actions of those who do.

2. Student Standards of Academic Conduct

Disciplinary proceedings may be initiated against any student who engages in scholastic dishonesty, including, but not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, or material which has been submitted within a different course without explicit approval of the instructor, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.

i. “Cheating” includes, but is not limited to:

- copying from another student’s test paper;
- using, during a test, materials not authorized by the person giving the test;
- failure to comply with instructions given by the person administering the test;
- possession during a test of materials, or devices and instruments allowing access to materials, which are not authorized by the person giving the test, such as class notes or specifically designed “crib notes” as well as cell phones, to name a few. The presence of textbooks constitutes a violation if they have been specifically prohibited by the person administering the test;
- using, buying, stealing, transporting, or soliciting in whole or part the contents of an unadministered test, test key, homework solution, or computer program;

- collaborating with or seeking aid from another student or person during a test or other assignment without explicit authorization;
 - discussing the contents of an examination with another student who will take the examination;
 - divulging the contents of an examination, for the purpose of preserving questions for use by another, or removing material from the exam location, when the instructors has designated that the examination is not to be removed from the examination room or not to be returned or to be kept by the student;
 - substituting for another person, or permitting another person to substitute for oneself to take a course, a test, or any course-related assignment;
 - paying or offering money or other valuable thing to, or coercing another person to obtain an unadministered test, test key, homework solution, or computer program or information about an unadministered test, test key, home solution or computer program;
 - falsifying research data, laboratory reports, and/or other academic work offered for credit;
 - taking, keeping, misplacing, or damaging the property of The University of Texas at Tyler, or of another, if the student knows or reasonably should know that an unfair academic advantage would be gained by such conduct; and
 - misrepresenting facts, including providing false grades or resumes, for the purpose of obtaining an academic or financial benefit or injuring another student academically or financially.
- ii. “Plagiarism” includes, but is not limited to, the appropriation, buying, receiving as a gift, or obtaining by any means another’s work and the submission of it as one’s own academic work offered for credit.
- iii. “Collusion” includes, but is not limited to, the unauthorized collaboration with another person in preparing academic assignments offered for credit or collaboration with another person to commit a violation of any section of the rules on scholastic dishonesty.
- iv. All written work that is submitted will be subject to review by plagiarism software.
- v. Penalty for any related infractions will be decided at the discretion of the instructor including, but not limited to, granting of a failing grade in part or the course or in the entire course.

3. Students Rights and Responsibilities

To know and understand the policies that affect your rights and responsibilities as a student at UT Tyler, please follow this link: <http://www.uttyler.edu/wellness/rightsresponsibilities.php>

4. Important Covid-19 Information for Classrooms and Laboratories

It is important to take the necessary precautions to ensure a healthy and successful year. UT Tyler continues to urge you to protect yourselves against the flu, COVID and any new threats that may be developing. Be diligent about preventive measures such as washing hands, covering sneezes/coughs, social distancing and vaccinations, which have proven to be successful in slowing the spread of viruses. Encourage those who don’t feel well to stay home, and if they show symptoms, ask them to get tested for the flu or COVID. Self-isolation is important to reduce exposure ([CDC quarantine/isolation guidelines](#)). Please work with your faculty members to maintain coursework and please consult [existing campus resources](#) for support.

5. Recording of Class Sessions

Class sessions may be recorded by the instructor for use by students enrolled in this course. Recordings that contain personally identifiable information or other information subject to FERPA shall not be shared with individuals not enrolled in this course unless appropriate consent is obtained from all relevant students. Class recordings are reserved only for the use of students enrolled in the course and only for educational purposes. Course recordings should not be shared outside of the course in any form without express permission.

6. Campus Carry

We respect the right and privacy of students 21 and over who are duly licensed to carry concealed weapons in this class. License holders are expected to behave responsibly and keep a handgun secure and concealed. More information is available at <http://www.uttyler.edu/about/campus-carry/index.php>

7. UT Tyler a Tobacco-Free University

All forms of tobacco will not be permitted on the UT Tyler main campus, branch campuses, and any property owned by UT Tyler. This applies to all members of the University community, including students, faculty, staff, University affiliates, contractors, and visitors. Forms of tobacco not permitted include cigarettes, cigars, pipes, water pipes (hookah), bidis, kreteks, electronic cigarettes, smokeless tobacco, snuff, chewing tobacco, and all other tobacco products. There are several cessation programs available to students looking to quit smoking, including counseling, quitlines, and group support. For more information on cessation programs please visit www.uttyler.edu/tobacco-free.

8. Grade Replacement/Forgiveness and Census Date Policies

Students repeating a course for grade forgiveness (grade replacement) must file a Grade Replacement Contract with the Enrollment Services Center (ADM 230) on or before the Census Date of the semester in which the course will be repeated. Grade Replacement Contracts are available in the Enrollment Services Center or at <http://www.uttyler.edu/registrar>. Each semester's Census Date can be found on the Contract itself, on the Academic Calendar, or in the information pamphlets published each semester by the Office of the Registrar.

Failure to file a Grade Replacement Contract will result in both the original and repeated grade being used to calculate your overall grade point average. Undergraduates are eligible to exercise grade replacement for only three course repeats during their career at UT Tyler; graduates are eligible for two grade replacements. Full policy details are printed on each Grade Replacement Contract.

The Census Date is the deadline for many forms and enrollment actions of which students need to be aware. These include:

- Submitting Grade Replacement Contracts, Transient Forms, requests to withhold directory information, approvals for taking courses as Audit, Pass/Fail or Credit/No Credit.
- Receiving 100% refunds for partial withdrawals. (There is no refund for these after the Census Date.)
- Schedule adjustments (section changes, adding a new class, dropping without a "W" grade).
- Being reinstated or re-enrolled in classes after being dropped for non-payment.

- Completing the process for tuition exemptions or waivers through Financial Aid.

9. State-Mandated Course Drop Policy

Texas law prohibits a student who began college for the first time in Fall 2007 or thereafter from dropping more than six courses during their entire undergraduate career. This includes courses dropped at another 2-year or 4-year Texas public college or university. For purposes of this rule, a dropped course is any course that is dropped after the census date (See Academic Calendar for the specific date). Exceptions to the 6-drop rule may be found in the catalog. Petitions for exemptions must be submitted to the Enrollment Services Center and must be accompanied by documentation of the extenuating circumstance. Please contact the Enrollment Services Center if you have any questions.

10. Disability/Accessibility Services

The University of Texas at Tyler has a continuing commitment to providing reasonable accommodations for students with documented disabilities. Like so many things this Fall, the need for accommodations and the process for arranging them may be altered by the COVID-19 changes we are experiencing and the safety protocols currently in place. Students with disabilities who may need accommodation(s) in order to fully participate in this class are urged to contact the Student Accessibility and Resources Office (SAR) as soon as possible, to explore what arrangements need to be made to ensure access. During the Fall 2020 semester, SAR will be conducting all appointments via ZOOM. If you have a disability, you are encouraged to visit <https://hood.accessiblelearning.com/UTTyler> and fill out the New Student Application. For more information, please visit the SAR webpage at <http://www.uttyler.edu/disabilityservices> or call 903.566.7079.

11. Student Absence due to Religious Observance

Students who anticipate being absent from class due to a religious observance are requested to inform the instructor of such absences by the second class meeting of the semester.

12. Student Absence for University-Sponsored Events and Activities

If you intend to be absent for a university-sponsored event or activity, you (or the event sponsor) must notify the instructor at least two weeks prior to the date of the planned absence. At that time the instructor will set a date and time when make-up assignments will be completed.

13. Social Security and FERPA Statement

It is the policy of The University of Texas at Tyler to protect the confidential nature of social security numbers. The University has changed its computer programming so that all students have an identification number. The electronic transmission of grades (e.g., via e-mail) risks violation of the Family Educational Rights and Privacy Act; grades will not be transmitted electronically.

14. Emergency Exits and Evacuation

Everyone is required to exit the building when a fire alarm goes off. Follow your instructor's directions regarding the appropriate exit. If you require assistance during an evacuation, inform your

instructor in the first week of class. Do not re-enter the building unless given permission by University Police, Fire department, or Fire Prevention Services.

15. UT Tyler Resources for Students

- UT Tyler Writing Center (903.565.5995), writingcenter@uttyler.edu
- UT Tyler Tutoring Center (903.565.5964), tutoring@uttyler.edu
- The Mathematics Learning Center, RBN 4021, this is the open access computer lab for math students, with tutors on duty to assist students who are enrolled in early-career courses.
- UT Tyler Counseling Center (903.566.7254)