

MEMORANDUM FOR STUDENTS ENROLLED IN CHEN 3310

SUBJECT: CHEN 3310 Chemical Engineering Materials - Administrative Instructions

Lecture times: Tu/Th 8:00AM - 9:20AM

Location: RBN 2007

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Welcome to CHEN 3310 Chemical Engineering Materials. This is an introductory course in materials science which is a broad, multidisciplinary field applicable to several areas of chemical, biological, mechanical, electrical, and civil engineering. The course covers fundamental characteristics of various materials, including metals, ceramics, polymers, and composite materials. Specific topics covered in the course are:

- Bonding and crystal structure of materials;
- Electrical and mechanical properties of materials;
- Phase diagrams and heat treatment, corrosion and environmental effects;
- Application of metal alloys, ceramics, polymers, composites.

The main objective of this course is to understand the physical, mechanical, electrical, optical, and magnetic properties of materials in order to improve the materials various applications. The specific learning objectives of the course are listed below.

Mode of delivery: This is an **in-person course** where we will meet during the assigned lecture times at the assigned lecture room. Subject to the availability of the instructor (such as attending academic conferences) and course progress, a few lectures might be offered as video sessions. The video course details will be shared via Canvas. Course assignments, such as homework and open-ended projects, will always be submitted online via Canvas.

Import Covid-19 information: 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. Students are encouraged to stay home when not feeling well. The students are suggested to get tested for the flu or COVID if any symptom. Self-isolation is important to reduce exposure ([CDC quarantine/isolation guidelines](#)). Please work with the instructor to maintain coursework and please consult [existing campus resources](#) for support.

1. The course has the following prerequisite courses which must be completed successfully prior to taking this course:

- General Chemistry I (CHEM-1311)
- Chemical Engineering Mechanics (CHEN 2320)

2. You are encouraged to seek additional instruction (AI) during my office hours, before/after class, or by appointment. Take advantage of this opportunity, it's FREE and really will help! To take the advantage of AI, the following avenues are available:

- Scheduled office hours: Tu/Th 10:00 am – 12:00 pm
- Email to setup an appointment if you have a scheduling conflict during the office hours.

3. Classroom Procedures:

a) Please bring textbooks, calculators, and other learning devices to every class. If you have an ebook or e-copy of a book, you are welcome to bring your laptops/tablets. Please read the relevant assigned reading materials in the book. Attendance is highly encouraged, and it will help you to get high final grade. You will not be able to share calculators during exams or quizzes. If your calculator fails, I am not responsible to furnish a substitute. Class preparation is your individual responsibility.

b) Textbooks:

Materials Science and Engineering: An Introduction 10e by William D. Callister

(Please email me if you plan on using earlier versions of the book. The content in the previous versions of the book is nearly identical. If a problem set is posted, which is not available in the old version, I will post the typed questions online.)

c) Recitations:

Certain lectures will be used for recitation sessions. The instructor will compile a selection of problems to practice problem-solving skills based on the topics covered in the earlier lectures. This session will be helpful in solving the homework problems, preparing for the quizzes, and examinations. Please bring book (or ebook) to class for this session.

4. Evaluations

a) Academic Dishonesty:

All work must be your own. Plagiarism of assignments (homework, projects, etc.) will not be tolerated. You can get help from others; however, all help from others must be documented. Please refer to the University of Texas at Tyler current Undergraduate Catalog for academic policies and Manual of Policies and Procedures for Student Affairs (MOPPS, Chapter 8) regarding academic integrity, cheating, and plagiarism

b) Homework:

Homework will help you understand the course materials better and are mandatory. Students may *discuss* their homework solutions with one another, but each student must submit their own, independent solutions (i.e. you may not just copy someone else's homework). If you receive assistance from a fellow student on a problem, you must cite that assistance within your solution. The problems assigned in a homework should not only be correct but should also be neat, organized, and complete (showing all the intermediate steps). No guess work should be required to see what you did. Solutions to the homework problems will be posted online after the due date.

A. Late submissions: Late homework will receive the following penalties:

- 0-24 hrs late – a 25% deduction of the earned grade
- 24-48- hrs late – a 50% deduction of the earned grade
- More than 48 hrs late – No credit

B. All homework in this course must be properly documented. As you are having your work reviewed it is likely that you might receive help from your classmates, just simply document it. Information from the course textbooks (equations and outlines of procedures), class notes, or me is considered immediately available to all students and need not be acknowledged or documented. **YOU ARE REQUIRED TO ACKNOWLEDGE AND DOCUMENT ALL OTHER ASSISTANCE AND REFERENCES USED.** Documentation will be accomplished in accordance with any manual for writing, footnote or endnote, for papers, but for written homework, just place the documentation right at the point you received help using Who and what assistance.

c) Quizzes:

There will be four quizzes on the scheduled dates during the semester. Quizzes will be based on previous homework assignments.

d) Extra credit:

There will be several opportunities to earn bonus points for additional work on problem sets, exams, or for completion of other optional assignments. Such opportunities (optional assignments) will be clearly identified. The optional assignment may help you increase your overall grade.

e) Midterm Exams and Final Exam:

There will be two mid-term exams and one final exam. The dates for Midterms are included in the course schedule. Official reasons for missing an exam are outlined in "Student handbook". You are required to take a make-up exam, regardless of your reason for missing the scheduled exam. Report any conflict to me as soon as possible prior to

the exam. Exams and the final are closed book and notes. You may only use a NCEES approved (or FE equivalent) calculator (eg. Casio – FX 115 ES, TI 30XA etc.). Solutions to the exams will not be posted, however the exam will be solved in class after the graded exams are returned.

f) Fall Special:

This year, all the students in the College of Engineering will participate in a “hands-on” project, which will consist of a group competition on October 22nd (Saturday). As part of the activities of this course, CHEN 3310 students will participate in a “Extreme Water Treatment” competition (competing against groups of Chem Eng sophomore and seniors). The purpose of this competition is twofold: (1) to provide students the opportunity to wrestle with an open-ended, practical engineering problem, and (2) to increase awareness of STEM Challenges across the state of Texas. The competition focuses on four distinct aspects: (1) creating an innovative solution to a wastewater treatment problem, (2) authoring a technical report describing the project management, design, engineering, and construction of the treatment solution, (3) delivering a video oral report relaying technical and management information regarding the project, and (4) physically testing the solution and displaying the elements to be judged. The bulk of the activities that form the competition are analogues of the real-world skills that practicing engineers and project managers in the new millennium must possess. Student teams will consist of 4 or 5 students, who will be responsible for answering questions during the Oral Presentation. Each team shall designate a registered participant as their team captain. Additional details about the Fall Special will be made available in a separate document.

5. Grading

Submitted assignments should be correct, neat, and complete. The points in the course are assigned as follows:

| Course Points | |
|-------------------------------------|-----------|
| Midterm Exams (2 at 15 points each) | 30 (30%) |
| Homework (8 at 2 points each) | 16 (16%) |
| Quizzes (4 at 5 points each) | 20 (20 %) |
| Project (1 at 6 point) | 14 (14%) |
| Final Examination (1 at 20 point) | 20 (20 %) |

| Grade Scale based on points | |
|---|---|
| 1.15 x class average or higher | A |
| Between class average and 1.15x time class | B |
| <i>Between 50 points and the class average</i> | C |
| Between 30 and 50 points | D |
| Less than 30 points | F |

You need at least 50 points total to pass the course with a C grade. You need to be at the class average to receive a B grade.

If you are not satisfied with the score you receive in any of the graded work, you should let me know why the grade should be higher (due to miscounting or incorrect grading) in writing within one week of receiving back the graded work.

6. Collection of Student Work:

Throughout the semester I will collect student work (best, average, and worst) for the ABET course and outcomes notebooks. This will require me to make a copy of your work, keep your original and return a copy of the graded work to you. I will not draw attention as to what level of work you accomplished.

7. Assigned Readings:

You are required to do the assigned reading prior to class as it will help you to understand the material presented during the instruction and will give you an opportunity to ask questions on topics you found difficult.

8. 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.

9. 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>

10. 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>

11. 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.

12. 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. a. Submitting Grade Replacement Contracts, Transient Forms, requests to withhold directory information, approvals for taking courses as Audit, Pass/Fail or Credit/No Credit.

- b. Receiving 100% refunds for partial withdrawals. (There is no refund for these after the Census Date)
- c. Schedule adjustments (section changes, adding a new class, dropping without a "W" grade)
- d. Being reinstated or re-enrolled in classes after being dropped for non-payment
- e. Completing the process for tuition exemptions or waivers through Financial Aid

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 that students need to be aware of. These include:

13. 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.

14. Disability Services:

In accordance with federal law, a student requesting accommodation must provide documentation of his/her disability to the Disability Services counselor. If you have a disability, including a learning disability, for which you request an accommodation, please contact the Disability Services office in UC 3150, or call (903) 566-7079.

15. 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.

16. 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.

17. 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.

18. 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.

19. Additional UT Tyler Resources for Students

- [UT Tyler Writing Center](mailto:writingcenter@uttyler.edu) (903.565.5995), writingcenter@uttyler.edu
- [UT Tyler Tutoring Center](mailto:tutoring@uttyler.edu) (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)

20. CHEN3310 Chemical Engineering Materials Course Objectives

- Analyze relationships between the elastic, plastic, and fracture properties of materials and their bonding and microstructure.
- Analyze fatigue, creep and fracture mechanics for material selection and component design.
- Predict rates of material failures and select materials to avoid failure.
- Predict the composition of phases in alloys from phase diagram.
- Identify the basic elements of corrosion in metals.
- Understand the fundamentals of materials and their physical and mechanical properties.

21. ABET Outcomes

- an ability to communicate effectively with a range of audiences. (3)
- an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts. (4)
- an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives. (5)
- an ability to acquire and apply new knowledge as needed, using appropriate learning strategies. (7)

22. Course Outline

1. Bonding between atoms, packing of atoms in solids.
2. Imperfection, defects and dislocation in solids.
3. Diffusion and Fick's laws.
4. Elasticity, the physical basis of Young's modulus.
5. Plasticity, yielding, ductility, dislocations, strengthening.
6. Failure, fatigue and creep.
7. Phase diagram.
8. Basic knowledge on metals, ceramics, polymers and composites.
9. Corrosion and degradation. *
10. Brief introduction to electrical, magnetic and optical materials. *

*Note: If time allows.

23. Tentative Class Schedule:

| | Date | Topics | Chapter | Evaluations | Due |
|------|------------|--|---------|-------------|--|
| Aug | 23 | Introduction Atomic Structure and Interatomic Bonding | 1, 2 | | |
| | 25 | Atomic Structure and Interatomic Bonding | 2 | HW 1 | |
| | 30 | The Structure of Crystalline solids | 3 | | |
| Sept | 1 | The Structure of Crystalline solids | 3 | HW 2 | HW 1 Due |
| | 6 | Imperfections in Solids | 4 | Quiz 1 | |
| | 8 | Imperfections in Solids | 4 | | HW 2 Due |
| | 13 | Diffusion | 5 | HW 3 | |
| | 15 | Mechanical Properties of Metals | 6 | | |
| | 20 | Mechanical Properties of Metals | 6 | HW 4 | HW 3 Due, Fall Special Lab Report 1 |
| | 22 | Midterm 1 | | Midterm 1 | |
| | 27 | Dislocation and Strengthening Mechanisms | 7 | | HW 4 Due |
| Oct | 29 | Dislocation and Strengthening Mechanisms | 7 | | |
| | 4 | Failure | 8 | Quiz 2 | |
| | 6 | Failure | 8 | HW 5 | |
| | 11 | Phase Diagrams | 9 | | Fall Special Design Paper, Video Presentation |
| | 13 | Phase Diagrams | 9 | | HW 5 Due |
| | 18 | Phase Transformations | 10 | Quiz 3 | |
| | 20 | Career Success Conference | | | |
| | 22 | Fall Special Big Day | | | Fall Special Water Testing and Product Display |
| Nov | 25 | Phase Transformations | 10 | HW 6 | |
| | 27 | Midterm 2 | | Midterm 2 | |
| | 1 | Structure and Properties of Ceramics | 12 | | HW 6 Due |
| | 3 | Structure and Properties of Ceramics | 12 | HW 7 | |
| | 8 | Polymer Structures | 14 | | |
| | 10 | Polymer Structures | 14 | Quiz 4 | HW 7 Due |
| | 15 | Composites | 15 | | |
| 17 | Composites | 15 | HW 8 | | |

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|-----|-----|--|----|--|----------|
| | 22 | Thanksgiving Break | | | |
| | 24 | | | | |
| | 29 | Corrosion and Degradation of Materials | 17 | | HW 8 Due |
| Dec | 1 | Review for Final | | | |
| | 5-9 | Final Exam Week | | | |

Note: This syllabus, including the grading criteria, schedule and the content, are tentative. They can be changed at anytime at the sole discretion of the instructor