SYLLABUS
MENG 3114-301: MATERIALS SCIENCE
(Required Course)
Summer 1 2022

COURSE INSTRUCTOR
Dr. Pranaya Pokharel (pranaya.pokharel@msutexas.edu)

LAB INSTRUCTOR
Dr. Pranaya Pokharel (pranaya.pokharel@msutexas.edu)

COURSE & LAB SCHEDULE

Days	***Time***	***Location***
Monday	12:20 pm – 2:20 pm	MY 136
Tuesday	12:20 pm – 2:20 pm 02:30 pm – 04:30 pm*	MY 136 MY 125
Wednesday	12:20 pm – 2:20 pm	MY 136
Thursday	12:20 pm – 2:20 pm 02:30 pm – 04:30 pm*	MY 136 MY 125
Friday		

**Lab sessions are indicated with an asterisk.*

OFFICE HOURS

Days	***Time***	***Location***
Monday	04:30 – 5.30 pm	MY 219C
Tuesday	04:30 – 5.30 pm	MY 219C
Wednesday	04:30 – 5.30 pm	MY 219C
Thursday	04:30 – 5.30 pm	MY 219C
Friday	By Appointment	

CATALOG DESCRIPTION
Study of the physical and mechanical characteristics of materials, and the effects of chemical composition, mechanical treatment, and thermal or heat treatment upon material properties. Companion lab.

COURSE PRE-REQUISITES
MENG 2223, CHEM 1143

REQUIRED TEXTBOOK
Materials Science and Engineering: An Introduction (9^{th} or 10^{th} edition) by W.D. Callister & D.G. Rethwisch.

TOPICS COVERED
- From atoms to microstructure: Interatomic bonding, structure of crystals, crystal defects, non-crystalline materials.
- Mass transfer and atomic mixing: Diffusion, kinetics of phase transformations.
- Mechanical properties, elastic and plastic deformation, dislocations and strengthening mechanisms, materials failure.

- Phase diagrams: Maps of equilibrium phases.
- Polymer structures, properties and applications of polymers.
- Electrical, thermal, magnetic, and optical properties of materials.

Additional material may be covered as time permits.

GRADING
The overall grade for the course will be based on the scores earned on the homework assignments, quizzes, exams, and the attendance. The homework assignments and quizzes account for 10% of the course grade, exams account for 65% of the course grade, and attendance accounts for 5%. Laboratory participation and reports accounts for the remaining 20% of the course. The overall score for the course is determined as follows.

Table 1: Percentage contribution of each assignment.

Assignments	Contribution
Test 1	20%
Test 2	20%
Final Exam	25%
Attendance	5%
Homework	10%
Laboratory participation and lab report	20%
Total	100%

FINAL EXAM
Thursday, June 30, 12:20 pm – 2:20 pm

COURSE ORGANIZATION AND ASSESMENT

- **Course Format:**
  This course consists of four 120-minute sessions and two 120-minute lab sessions each week. Class meetings will contain lecture sessions that cover the relevant topics for that particular class. Not all material can be covered during the class session.

- **Class Attendance:**
  You are expected to attend class regularly and are responsible for notes, homework assignments, quizzes and exams missed while absent. Attendance (or lack thereof) directly affects the course grade. ***Attendance is considered very important in this course, and counts for 5% of the grade.***

- **Student Attitude:**
  Once class starts, the use of cell phones, conducting private discussions, using the computer (unless requested by the instructor), working on anything that is not directly related to the course, and making derogatory remarks about your classmates or instructor will not be accepted and may result in your dismissal from the class.

- **Midterm Progress Reports:**
  In order to help students keep track of their progress toward course objectives, the instructor for this class will provide a Midterm Progress Report for at-risk students through their WebWorld account. Midterm grades will not be reported on the students' transcript; nor will they be calculated in the cumulative GPA. They simply give students an idea of where they stand at the midpoint of the semester. Students earning below a C at the midway point should schedule a meeting with the professor and seek out tutoring.

- **Homework Evaluation Method:**
  Your performance will be tested regularly throughout the semester by homework assignments. While several homework problems may be assigned as part of a homework assignment, it may be the case that only a subset of problems will be graded. However, you must attempt all problems. ***Do not try to guess which problems will not be graded.***

- **Late Assignments:**
  Homework assignments must be turned in on the due date, at the beginning of class. Once class starts, late assignments will ***NOT*** be accepted.

- **Pop-Quizzes:**
  There ***MIGHT*** be a few pop-quizzes throughout the semester that are related to the specific homework problems assigned to distinguish those who work by themselves from those who copied others' works, or the solution manual.

- **Exam Make-up:**
  Make-up exams will be given only in case of an emergency (accompanied by a doctor's report) or a major conflict due to a scheduled athletic event or a conference.

- **General Study Guidelines:**
  Plan on spending few hours outside of class each week to study the material and to work on homework assignments. Do not wait until the last day to start the homework or to prepare for exams. Utilize office hours throughout the semester whenever you need help about the assignments or the course material.

GENERAL EDUCATION STATEMENT

Students in this course must demonstrate their proficiency in oral and written communication through written homework assignments and exams.

ACADEMIC INTEGRITY POLICY

Scholastic dishonesty will not be tolerated and will be prosecuted to the fullest extent. You are expected to have read and understood the current issue of the student handbook regarding student responsibilities & rights, and the intellectual property policy information about procedures and what constitutes acceptable on-campus behavior. More details can be found at https://msutexas.edu/student-life/_assets/files/handbook.pdf

CONFLICT RESOLUTION

- The student should contact the instructor face to face or via e-mail if there is an issue with the course or the instructor. The faculty and the student will discuss this face to face or via email. Hopefully a resolution is reached on the issue.
- The student should notify the faculty via email again if the issue still did not get resolved after the first encounter or communication.
- The student can then contact the Chair of the McCoy School of Engineering, Dr. Desai, face to face or via email, (raj.desai@msutexas.edu), and discuss this issue. Dr. Desai will discuss the issue at hand with the faculty member. Dr. Desai will discuss the result of this discussion with the student. Hopefully a resolution is reached on the issue after this.
- The student should notify the Chair via email if the issue still did not get resolved.
- The Chair will contact the Dean and try to resolve the conflict. In case the conflict deals with the student grade, she will forward the case to the Grade Appeals Committee if necessary.

DISABILITY SUPPORT SERVICES

If you have a documented disability that will impact your work in this class, please contact me to discuss your needs.

DISCLAIMER STATEMENT

Information contained in this syllabus, other than grading policies, may be subject to change with advance notice, as deemed appropriate by the instructor.

Senate Bill 11 passed by the 84th Texas Legislature allows licensed handgun holders to carry concealed handguns on campus, effective August 1, 2016. Areas excluded from concealed carry are appropriately marked, in accordance with state law. For more information, please refer to campus carry rules and policies.

COURSE LEARNING OBJECTIVES AND RELATIONSHIP TO STUDENT OUTCOMES

Table 2: Course learning objectives related to the ABET criteria (1-7)

Outcome-Related Course Learning Objectives	1	2	3	4	5	6	7
Overall, to develop an understanding of fundamental concepts of crystalline and non-crystalline structures, defects, diffusion, phases, solidification, solid state phase transformations and apply the same to the major classes of materials: metals, ceramics, polymers and composites	X	X					
To enable students to understand why crystalline and non-crystalline structure of materials lead to widely different properties.	X						
To enable students to recognize that one of the important characteristics of a material is how it responds to different stresses, and that this response is related to the temperature of the material.	X	X					

Outcome-Related Course Learning Objectives	1	2	3	4	5	6	7
To enable students to realize that equilibrium phase diagrams are useful in understanding the development and preservation of non-equilibrium structures and their attendant properties.	X						
To enable students to design heat treatments phase transformations for some alloy that will yield the desired room temperature mechanical properties.	X	X		X		X	
To enable students to make informed decisions involving materials selection and processing.	X	X		X			
To enable students to become familiar with the materials science and metallographic laboratory equipment.	X	X			X	X	

Table 3: Detailed interpretations of the ABET criteria (1-7) listed in Table 2.

ABET Criteria	Interpretation
1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2	an ability to apply engineering design to produce solutions that meets specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3	an ability to communicate effectively with a range of audiences.
4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5	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.
6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

For safety, please stay home if sick. If you have not already done so, we also encourage you to take the vaccine/booster if able to do so.

Student Resources https://msutexas.edu/academics/scienceandmath/student_resources.php

Prepared by Pranaya Pokharel, May 2022.