

MAE 20
Elements of Materials Science
Winter 2011
T, Th.: 5-6:20 pm
CENTER 105

Prof. Joanna McKittrick
EBU II, Room 257

phone: 858-534-5425
jmckittrick@ucsd.edu

Office hours

Wed. 2-3 & Thurs. 11-12 pm and by appointment. Students are encouraged to contact me at any time by e-mail. I will respond promptly. Please put MAE 20 in the subject heading.

Teaching Assistant

Steve Lee (shtdong@gmail.com)

Course description

This class will introduce the fundamentals of materials science. Crystal structures and imperfections, movement of atoms, phase diagrams, mechanical and electrical properties of metals, ceramics, polymers and semiconductors will be discussed.

Textbook

W.D. Callister, Materials Science and Engineering, An Introduction, 7th Ed., John Wiley and Sons, 2007. Text website: <http://www.wiley.com/college/callister>

Website

<http://maecourses.ucsd.edu/~jmckittr/mae20-wi11/>

Username: MAE20 Password: %materials&

Lecture notes will be posted here. Please bring the lecture notes to class. Homework assignments and solutions will also be posted here

Homework

The homework will be given on Tues. and due the following Tues. ***No late homework will be accepted after the beginning of class.*** It is the responsibility of each student to obtain the homework assignment, which will be posted on the website, along with the solutions. Re-grades must be made within a week after receiving the graded assignment. A written explanation (along with your e-mail address) must be submitted. Graded homework assignments will be available outside of EBU II, Room 281. Sloppy, illegible homework will be returned ungraded. Use one side of paper only. Clearly highlight your answers.

Students are encouraged to discuss class topics and work on homework assignments together, however, direct copying will not be tolerated. Any identical or similar homework solutions from two or more students will be given a '0' score and reported to Prof. McKittrick. Please see the UCSD Policy on Integrity of Scholarship at:

<http://www-senate.ucsd.edu/manual/appendices/app2.htm#AP14>

Midterm exam

There will be two (1 hr.) exams on Thurs., Feb. 3 and Thurs., Mar. 3. ***There are no make-up exams.*** There are some allowable excuses – examples: UCSD-sanctioned events (with letter from faculty sponsor), illness (doctor's note mandatory specifying that you were too ill to take the exam). Closed book and notes – an equation sheet will be provided.

Final exam

The final will be comprehensive and is on Thurs. March 17, 7-10 pm (in classroom).

Grading

Homework	20%
Midterms (2)	40%
Final	40%

Class outline

Week	Topic	
1	Introduction, atomic structure, crystal structures	Chapters 1-3
2	Crystal structures, crystalline imperfections	Chapters 3, 4
3	Diffusion, mechanical properties	Chapters 5, 6
4	Mechanical properties, dislocations	Chapters 6, 7
5	Dislocations	Chapter 7 (Exam 1, Chapters 2-6)
6	Failure	Chapter 8
7	Phase diagrams	Chapter 9
8	Phase transformations	Chapter 10
9	Polymers	Chapter 14 (Exam 2, Chapters 7-10)
10	Polymers and composites	Chapters 15, 16