COURSE DESCRIPTION

The structure of materials: metals, ceramics, glasses, semiconductors, superconductors, and polymers to produce desired, useful properties. Atomic structures. Defects in materials, phase diagrams, microstructural control. Mechanical and electrical properties are discussed. Time temperature transformation diagrams. Diffusion.

Prerequisites: PHYS 2A or 4A, CHEM 6A or CHEM 6AH, and MATH 20C.

GENERAL COURSE INFORMATION

Instructor: Dr. Olivia A. Graeve
Phone: (858) 246-0146
E-mail: ograeve@ucsd.edu
Course web site: http://graeve.ucsd.edu/MAE20/
Office: EBUII 359
Course meetings: Tuesday and Thursday, 7:30 – 9:20 AM
Classroom: CENTR 105

Office Hours: Monday, September 30, 11:00 AM – 1:00 PM
Monday, October 7, 11:00 AM – 1:00 PM
Monday, October 14, 11:00 AM – 1:00 PM
Monday, October 21, 11:00 AM – 1:00 PM
Monday, October 28, 10:30 AM – 12:00 PM
Monday, November 4, 12:00 – 1:00 PM
Monday, November 18, 11:00 AM – 12:00 PM
Monday, November 25, 11:00 AM – 1:00 PM
Monday, December 2, 11:00 AM – 1:00 PM
Monday, December 9, 11:00 AM – 1:00 PM

Teaching Assistant: Ingram Vargas
E-mail: cvargasc@eng.ucsd.edu
Office: EBUII 368
Office Hours: Mondays, 11:00 AM to 12:00 PM

REQUIRED TEXT

Title: Introduction to Materials Science for Engineers 8/e
Author: J.F. Shackelford
ISBN: 9780133826654

This book is available in eBook format through the bookstore.

TOPICS

- Ionic, covalent and metallic bonding
- Crystal and molecular structures
- Defects in materials
COURSE OBJECTIVES

All students who participate in MAE 20 should come away with:

- Knowledge of how materials have shaped technology development with an emphasis on present-day technologies.
- A recognition of the necessity of materials selection in their own engineering discipline and a description of some ways that materials properties determine performance in applications in their own discipline.
- A recognition of the practice of materials engineering and an identification of some ways that process choices influence structure and properties.
- An identification of various types of materials that would be appropriate for use in engineering applications, including biomedical, communication, electronics, transportation, recreation and construction.

EXAMINATIONS

There will be two midterm examinations and one final examination. The dates of each examination are indicated in the Lecture Schedule. Absence during examinations, without prior approval, will result in a zero. Prior approval will be given only under exceptional circumstances.

GRADING

Students will be graded using the following breakdown:

- Midterm examinations: 30% (15% each)
- Final examination: 40%
- Quizzes: 30%

TOTAL: 100%

MAE 20 STUDENT HONOR CODE

I have read the honor code below and agree with its provisions. My continued enrollment in this course constitutes full acceptance of this code:

I will not:

- give information or receive information from another person during an exam,
- use more reference material during an exam than is allowed by the instructor,
- plagiarize information from books, journals, or the Internet, and
- alter an exam after it has been graded and return it to the instructor for regrading.

HOMEWORK AND EXAMINATION SOLUTIONS

Solutions to all homework and examination solutions will be posted electronically on the following web site: http://graeve.ucsd.edu/MAE20/HomeworkSolutions.html
E-MAIL ETIQUETTE

Email is a very public means of information exchange, which should be treated with respect. As such, I expect that all students will write and respond to emails in a respectful manner.

An example of an appropriate email is:

October 1, 2019
Dear Dr. Graeve:
Could you please inform me of the reading assignment for this week?
Thank you,
John Doe

An example of an inappropriate email is:
Hey you what is the homework this week

This last email has misspellings, inappropriate punctuation, no salutation, no signature, no date, and is extremely disrespectful.

Note: Do not write emails that you would not want your mother or your lawyer to read. Assume, at all times, that everyone in the world will read any email you write.

DISABILITIES ACCOMMODATION

All students with disabilities who wish to request accommodations should contact the Office for Students with Disabilities. All information disclosed to this office by students will remain confidential, but the office will provide documentation that supports accommodations within the classroom (e.g., examination accommodations, notes, etc.). Please keep in mind that many accommodations require early planning, so requests should be made as soon as possible.

IDEA ENGINEERING STUDENT CENTER

The IDEA Engineering Student Center, located just to the right of the lobby of Jacobs Hall, is a hub for student engagement, academic enrichment, personal/professional development, leadership, community involvement, and a respectful learning environment for all. The Center offers a variety of programs, listed in the IDEA Center Facebook page at http://www.facebook.com/ucsdidea/ (you are welcome to Like this page!) and the Center web site at http://idea.ucsd.edu/.
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<td>Six Materials That Changed Your World</td>
<td>1.3, 3.1, 3.2</td>
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<td>Metallic Structures</td>
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<td>Tue, October 1</td>
<td>Ceramic, Semiconductor and Polymeric Structures</td>
<td>3.3, 3.4, 3.5</td>
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<td>Thur, October 3</td>
<td>No class</td>
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<td>Tue, October 8</td>
<td>Lattice Geometry and X-Ray Diffraction</td>
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<td>Thur, October 10</td>
<td>Chemical Imperfections and Point Defects</td>
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<td>Tue, October 15</td>
<td>Higher-dimensional Defects</td>
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<td>Thur, October 17</td>
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<td>5.1, 5.2</td>
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<td>Sat, October 19</td>
<td>Diffusion II</td>
<td>5.3, 5.4, 5.5</td>
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<td>8:30 – 10:20 AM CENTR 109</td>
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<td>Tue, October 22</td>
<td>Thermal Behavior of Materials</td>
<td>7.1, 7.2, 7.3</td>
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<td>Electronic Properties of Materials II</td>
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<td>Tue, November 5</td>
<td>Optical Properties of Materials</td>
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<td>Magnetic Properties of Materials</td>
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<td>Tue, November 12</td>
<td>Phase Diagrams</td>
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<td>Thur, November 14</td>
<td>The Lever Rule and Microstructural Development</td>
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<td>Tue, November 19</td>
<td>Kinetic Processes</td>
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<td>Thur, November 21</td>
<td>Microstructure Control</td>
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<td><strong>Second midterm examination</strong></td>
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<td>Tue, December 3</td>
<td>Environmental Degradation of Materials</td>
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<td>Thur, December 5</td>
<td>Materials Recycling</td>
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<td><strong>Tue, December 10</strong></td>
<td><strong>Final examination</strong></td>
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