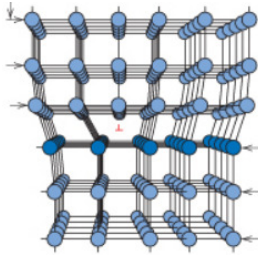


Engineering 4 – Section #51776



Instructor: Dr. John Heathcote **Class Times:** All Online

Office: Reedley College, FEM-1B (in Math Center, in FEM Building)

Phone: 638-3641 ext. 3215

e-mail: john.heathcote@reedleycollege.edu

Office Hours: Monday 11:00 am -11:50 am
 Tuesday 11:00 am -12:50 pm
 Thursday 11:00 am -12:50 pm
 If you cannot make regular office hours, feel free to make an appointment.

Required Text: Materials Science and Engineering, An Introduction, 8th Edition, William D. Callister, Jr., Wiley, **with WileyPLUS Access**

Catalog Description: An introductory course on the properties of engineering materials and their relation to the internal structure of materials. Topics include: atomic structure and bonding, crystalline structures, phases and phase diagrams, metals, polymers, ceramics, composites, mechanical deformation and fracture, structural control and influence of properties, materials naming and designating systems, electrical properties, and magnetic properties.

Online Course Presentation: This course is being taught as a fully-online course. That means that all lecture presentations, homework assignments and other class activities will be via the Blackboard class page and the WileyPLUS website.

Typically, there will be two due dates each week. By that date, students are expected to read the appropriate sections of the textbook, view any online materials, complete any homework problems or other activities, and/or take part in online discussions.

Grading:	20%	Online Quizzes
	60%	Online Homework Assignments
	20%	Written Homework Assignments
	10%	Online Discussions

Online Quizzes: There will be an online quiz following the conclusion of most chapters. These will check your understanding of the concepts and calculations from that chapter. During the quiz, you will be able to use your notes, your book, and any online resources. However, there will be a time limit on the quizzes. That means that you will not have the time to learn the material during the quiz. You will need to have a good understanding of the chapter before you get started.

Quiz questions will be multiple choice, fill-in-the-blank, short answer, or essay questions. They may involve calculations or be conceptual.

Online Homework Assignments: As a way of learning the material, students will have regular online assignments using WileyPLUS. Deadlines are very important. Late work will not receive full credit.

Written Homework Assignments: There will occasionally be assignments that are not the typical online homework assignment. Instead of performing these assignments through WileyPLUS website, you will be given a more open-ended assignment that you will submit with a Word file, spreadsheet file, or some other format. These assignments may be designed to go deeper into certain topics or to apply those topics.

Online Discussions: To foster a learning community in our online class, we will occasionally have online discussions based upon the topics that we are learning. To receive credit for these discussions, you will need to post statements on the topic and reply to other students' posts. Good grades will be given to students who contribute the most to the discussions.

Communication: Since we do not have an official meeting each week, it is important that you feel comfortable contacting me with any questions. Please feel free to call me, email me, come by my office hours, or post a comment on the Blackboard discussion board.

Grading Scale:	90-100%	A
	80-89%	B
	70-79%	C
	60-69%	D
	<60%	F

Add Date:	Friday, January 27 th	Last day to add a course
Drop Date:	Friday, March 9 th	Last day to drop this course
Holidays:	Monday, January 16 th	Martin Luther King Jr. Day
	Friday-Monday, Feb. 17-20 th	Presidents' Day Holidays
	Monday-Friday, April 2 nd -6 th	Spring Recess Holidays

Accommodations for Students with Disabilities:

If you have a verified need for an academic accommodation or materials in alternate media (i.e., Braille, large print, electronic text, etc.) per the Americans with Disabilities Act (ADA) or Section 504 of the Rehabilitation Act, please contact me as soon as possible.

There are special challenges when a course is offered online. Stay disciplined to do what is required of you. Keep up with every deadline!!! Do not procrastinate!

Course Outline: (subject to change) -- Assignments are due by 1PM on the day shown.

Due Dates	Textbook Chapter	Topics
Friday, January 13 th	1	Introduction
Wednesday, January 18th	2A	Atomic Bonding
Friday, January 20 th	2B	Atomic Bonding
Tuesday, January 24 th	3A	Crystal Structures
Friday, January 27 th	3B	Crystallography
Tuesday, January 31 st	3C	Crystalline Solids
Friday, February 3 rd	4A	Imperfections
Tuesday, February 7 th	4B	Imperfections
Friday, February 10 th	5A	Diffusion
Tuesday, February 14 th	5B	Diffusion
Tuesday, February 21 st	6A	Stress and Strain
Friday, February 24 th	6B	Elastic and Plastic Deformation
Tuesday, February 28 th	6C	Mechanical Properties
Friday, March 2 nd	6D	Mechanical Properties
Tuesday, March 6 th	7A	Dislocations/Plastic Deformation
Friday, March 9 th	7B	Strengthening Mechanisms
Tuesday, March 13 th	7C	Dislocations and Strengthening Mechanisms
Friday, March 16 th	8A	Fracture
Tuesday, March 20 th	8B	Fatigue / Creep
Friday, March 23 rd	8C	Failure
Tuesday, March 27 th	9A	Phase Diagrams
Friday, March 30 th	9B	Eutectic Phase Diagrams
Tuesday, April 10 th	9C	Iron-Carbon System
Friday, April 13 th	9D	Phase Diagrams
Tuesday, April 17 th	10A	Phase Transformations
Friday, April 20 th	10B	TTT Diagrams
Tuesday, April 24 th	10C	Phase Transformations and Mechanical Properties
Friday, April 27 th	11	Alloys
Tuesday, May 1 st	12/13	Ceramics
Friday, May 4 th	14/15	Polymers
Tuesday, May 8 th	16	Composites
Friday, May 11 th	11-16	Applied Materials
Tuesday, May 15 th	Semester Review Quiz/Assignment	Cumulative

COURSE OUTCOMES:

Upon completion of this course, students will be able to:

- A. distinguish the different crystal structures of various materials and infer the material properties determined by them.
- B. classify crystal imperfections and discuss their influence on materials processes.
- C. use mechanical behavior data for a given material to predict a material's behavior under a certain load condition.
- D. interpret phase diagrams and predict material microstructures created by different heat treatments.
- E. identify the properties of the various classes of materials.
- F. assess the proper material to be used in certain applications.

COURSE OBJECTIVES:

In the process of completing this course, students will:

- A. define the types of bonds and list their properties.
- B. classify the various crystal structures and use crystallographic techniques to describe their features.
- C. describe crystalline imperfections and analyze their influence on material behavior.
- D. analyze stress-strain curves and calculate materials' reactions to various stress conditions.
- E. differentiate elastic and plastic deformation.
- F. describe the mechanisms for strengthening materials.
- G. calculate failure loads of materials based on fracture and fatigue.
- H. calculate materials' reactions under high temperature loading.
- I. interpret phase diagrams and solve problems based upon them.
- J. use phase diagrams to predict microstructural development in materials under heat treatment.
- K. analyze the properties of the various classes of materials.
- L. categorize and investigate the variety of materials within each materials class.
- M. outline and apply the electrical, magnetic and corrosive properties of materials.