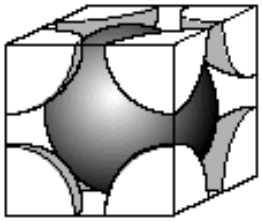
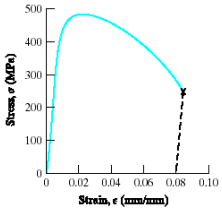
Engineering Materials — Spring 2010

Engineering 4 – *Section #56716*





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

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

Phone: 638-3641 ext. 3215

e-mail: john.heathcote@reedleycollege.edu

Office Hours:

Monday	11:00-11:50 am
Tuesday	12:00-12:50 pm
Thursday	11:00-11:50 am

If you cannot make regular office hours, feel free to make an appointment.

Required Text: Materials Science and Engineering, An Introduction, 7th 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 textbook, view any online materials, complete any homework problems or other activities, and/or take part in online discussions.

Grading:

25%	Online Tests
25%	Projects
50%	Homework Assignments, online discussions, and other activities

Online Tests: There will be three online tests during the term. These tests will be taken online. There will be a window of time during which students can access the test. Students can take the test at any time during this window. Once the test has begun, though, there will be a time limit to finish the test.

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

Projects: Along with each test, there will be a project to be completed after each unit. These projects will involve both reviewing the concepts that we are learning and applying those concepts to real technologies. The project will involve more involved questions than the test. For example, it may involve internet research, longer calculations, or even simple experiments.

Homework Assignments, online discussions, and other activities: As a way of learning the material, students will have a few assignments to complete. These involve traditional homework assignments, other worksheet activities, online discussions, or other assignments to be determined. All of these will be done online.

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 29th	Last day to add a course
Drop Date:	Friday, March 12th	Last day to drop this course
Holidays:	Monday, January 18th	Martin Luther King Jr. Day
	Friday-Monday, Feb. 12-15th	Presidents' Day Holidays
	Monday-Friday, March 29 – April 2nd	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.

Course Outline: (subject to change) -- Assignments are due "by the end of the day" on the day shown.

Due Dates	Textbook Chapter	Topics
Thursday, January 14th	1	Introduction
Tuesday, January 19th	2	Atomic Bonding
Thursday, January 21st	3A	Crystal Structures
Monday, January 25th	3B	Crystallography
Thursday, January 28th	4	Imperfections
Monday, February 1st	5	Diffusion
Thursday, February 4th	6A	Stress and Strain
Monday, February 8th	6B	Elastic and Plastic Deformation
Thursday, February 11th	6C	Mechanical Properties
Monday, February 22nd	Project 1 and Test 1	
Thursday, February 25th	7A	Dislocations/Plastic Deformation
Monday, March 1st	7B	Strengthening Mechanisms
Thursday, March 4th	8A	Fracture
Monday, March 8th	8B	Fatigue / Creep
Thursday, March 11th	9A	Phase Diagrams
Monday, March 15th	9B	Eutectic Phase Diagrams
Thursday, March 18th	9C	Iron-Carbon System
Monday, March 22nd	10A	Phase Transformations
Thursday, March 25th	10B	TTT Diagrams
	SPRING BREAK	
	SPRING BREAK	
Monday, April 5th	11	Alloys
Monday, April 12th	Project 2 and Test 2	
Thursday, April 15th	12A	Ceramic Structures
Monday, April 19th	12B	Properties of Ceramics
Thursday, April 22nd	14	Polymer Structures
Monday, April 26th	15	Characteristics of Polymers
Thursday, April 29th	16A	Composites
Monday, May 3rd	16B	Use of Composites
Thursday, May 6th	18A	Electrical Properties
Monday, May 10th	18B	Electrical Properties
Monday, May 17th	Project 3 and Test 3	

There are special challenges when a course is offered online. Stay disciplined to do what is required of you. Also, let me know what aspects of the online course you find effective or ineffective. Your input on how to make this course run more smoothly is appreciated!

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.