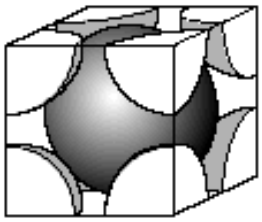
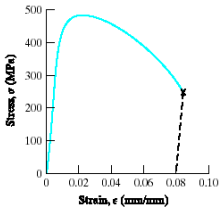
Engineering Materials Spring 2011

Engineering 4 – *Section #56716*





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	11:00-11:50 am (in Math Center)
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, 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 textbook, view any online materials, complete any homework problems or other activities, and/or take part in online discussions.

Grading:

25%	Online Tests
25%	Written Homework Assignments
50%	Online 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.

Written Assignments: Throughout the term, there will occasionally be assignments that are not the typical online homework assignment. Instead of performing these assignments from the WileyPLUS website, you will write out your answers on a Word document that will be provided to you on Blackboard. These assignments will be designed to go deeper into certain topics or to apply those topics.

Homework Assignments: As a way of learning the material, students will have regular online assignments on the WileyPLUS website. To receive full credit, you need to submit these assignments by the posted deadlines.

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 28th	Last day to add a course
Drop Date:	Friday, March 11th	Last day to drop this course
Holidays:	Monday, January 17th	Martin Luther King Jr. Day
	Friday-Monday, Feb. 18-21st	Presidents' Day Holidays
	Monday-Friday, April 18 –21st	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 **9AM** on the day shown.

Due Dates	Textbook Chapter	Topics
Friday, January 14th	1	Introduction
Wednesday, January 19th	2	Atomic Bonding
Friday, January 21st	3A	Crystal Structures
Tuesday, January 25th	3B	Crystallography
Friday, January 28th	Written Assignment #1	
Tuesday, February 1st	4	Imperfections
Friday, February 4th	5	Diffusion
Tuesday, February 8th	6A	Stress and Strain
Friday, February 11th	6B	Elastic and Plastic Deformation
Tuesday, February 15th	6C	Mechanical Properties
Friday, February 18th	Written Assignment #2	
Friday, February 25th	Test #1	
Tuesday, March 1st	7A	Dislocations/Plastic Deformation
Friday, March 4th	7B	Strengthening Mechanisms
Tuesday, March 8th	8A	Fracture
Friday, March 11th	8B	Fatigue / Creep
Tuesday, March 15th	Written Assignment #3	
Friday, March 18th	9A	Phase Diagrams
Tuesday, March 22nd	9B	Eutectic Phase Diagrams
Friday, March 25th	9C	Iron-Carbon System
Tuesday, March 29th	10A	Phase Transformations
Friday, April 1st	10B	TTT Diagrams
Tuesday, April 5th	11	Alloys
Friday, April 8th	Written Assignment #4	
Tuesday, April 12th	Test #2	
Friday, April 15th	12	Ceramic Structures
Tuesday, April 26th	13	Properties of Ceramics
Friday, April 29th	14	Polymer Structures
Tuesday, May 3rd	15	Characteristics of Polymers
Friday, May 6th	16	Composites
Tuesday, May 10th	17	Corrosive Properties
Friday, May 13th	18	Electrical Properties
Tuesday, May 17th	Written Assignment #5	
Friday, May 20th	Test #3	

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.