MASC/AME 551

Mechanical Behavior of Engineering Materials

Fall Term 2010

Lectures: OHE 100B TTh 9:30-10:50

Professor: Professor A.M. Hodge
Office: RTH 503
Office Hours: MF 11-12 or by appointment

TA I-Chung Cheng, ichungch@usc.edu
RTH 522

Class Textbook: "Mechanical Behavior of Materials" Meyers and Chawla, Cambridge University Press; 2 edition (2008-2009)

Supplemental Texts:

"Mechanical Metallurgy", G.E. Dieter
"Mechanical Behavior of Materials", T.H. Courtney
"Deformation and Fracture of Engineering Materials", R.W. Herzberg
"Mechanical Behavior of Materials", McClintock and Argon
"Fracture of Structural Materials", Tetelman and McEvily

"Introduction to Dislocations" D. Hull and D.J. Bacon 4th ed. Butterworth

Introductory Books:

"Materials Science and Engineering" 5th ed. William D. Callister
"Principles of Engineering Materials", Barrett, Nix and Tetelman

Objectives:

This course focuses on the mechanical properties of materials. The lectures will emphasize stress and strain relationships how the macroscopic mechanical behavior is related to the structure and microstructure of the material. This course will discuss elementary dislocation theory and relate this to basic strengthening mechanisms. Physical and chemical mechanisms that alter the mechanical properties will be discussed. Crystalline metals and ceramics will be emphasized and polymers and non-crystalline materials will be discussed as well. Fatigue and fracture will also be discussed in terms of fundamental mechanisms.

Grading:

Midterms (2)	50%
Presentations (1)	10%
Final Exam	40%

MASC/AME 551 MECHANICAL PROPERTIES OF ENGINEERING MATERIALS

WEEK	DATE	LECTURE TOPICS
1	8/24	Introduction
	8/26	Elasticity I
2	8/31	Elasticity II
	9/2	Elasticity III
3	9/7	Basic Plasticity
	9/9	True Stress and Strain
4	9/14	Dislocations intro
	9/16	no class- Make-up class TBA
5	9/21	Dislocations
	9/23	Strengthening mechanism
6	9/28	Strengthening mechanism cont.
	9/30	Strengthening mechanism cont.
7	10/5	**EXAM #1***
	10/7	Annealing
8	10/12	Heat Treatment of Steels
	10/14	Materials Processing
9	10/19	Materials processing and characterization
	10/21	Testing techniques
10	10/26	Nano mechanics
	10/28	Presentations Part 1
11	11/2	Brittle Fracture
	11/4	Ductile Fracture
12	11/9	Fatigue
	11/11	Creep- Superplasticity
13	11/16	Presentations Part 2
	11/18	Thin films mechanics
14	11/23	**EXAM #2***

	11/25	HOLIDAY – no class
15	11/30	Porous materials mechanics
	12/2	Material Review
16	Thursday, Dec. 9	**FINAL EXAM** 11-1 PM

*the tests dates are only tentative and can change during the semester