



University of Central Florida

Mechanical, Materials and Aerospace Engineering
EGN 3365: Structure and Properties of Materials
EAS 3607: Structure and Properties of Aerospace Materials
Fall 2004, 3 Credit Hours

Monday, Wednesday, Friday; 8:30 – 9:20 AM; Classroom: BA II, Room 208; Section 0001/0002

Instructor: Dr. Samar J. Kalita (“Dr. Samar”)
ENGR I, Room 245, Tel: (407) 283-3159
E-mail: samar@mail.ucf.edu
Office Hours: Monday, Wednesday; 9:30-10:20 AM or by appointment

TA: Ms. Abhilasha Bhardwaj, Research Pavilion 495, Tel: (407) 207-7497
E-mail: abhilashabhardwaj@yahoo.com
Problem solving sessions: Monday, Wednesday, 2:30-3:20 pm ENG 157

Text: Materials Science and Engineering - An Introduction, William D. Callister Jr., John Wiley & Sons Inc., 6th Edition, 2002.

Prerequisites: CHS 1440 or CHS 2045 (Chemistry) and MAC 2312 or MAC 2282 (Calculus II)

Grading:

Homework	10%
Quizzes	15%
Midterm Exam I	20%
Midterm Exam II	20%
Final Exam (Comprehensive)	30%
Design Case Study:	5%

The final grade assigned will include +/- modifiers.

General Policies:

1. There will be no make-up exam and quizzes given. In case of emergency/illness, special arrangement will be made on one-to-one basis.
2. Homework solutions will be made available in <http://webct.ucf.edu> on the day of submission after 5:00 PM. No homework will be accepted after the solutions are posted.
3. Feedback and suggestions to improve the quality of the class are always welcome.
4. Class participation is strongly encouraged and attendance is important.
5. To enhance learning and for your convenience, all the class notes will be made available to you through <http://webct.ucf.edu/> You will have to log on to the web using your PID and password. If you have any question or if you are not convenient with webCT, please contact WebCT Specialist Ms. Kim Okamoto in Room 289 (Engr-I); Telephone: 407-823-5248.
6. Class attendance is very important.
7. The dates for quizzes will be announced in class one lecture in advance.

Course Objectives:

1. To understand the importance of integrated roles played by chemistry, physics and mathematics in understanding the behavior of engineering materials.
2. To explain the major difference between material classes: metals, ceramics, polymers, composites and semiconductors.
3. To understand and appreciate various material properties: structural, mechanical, electrical, optical, biological and magnetic.
4. To explain certain material manufacturing processes.
5. To appreciate the processing-structure-property relationship in materials science and engineering.
6. To be able to use the knowledge gained for materials design and selection in engineering.

Catalog Description:

Atomic structure and bonding, crystal structure and imperfections, solidification, phase transformations, phase diagram, heat treatment, mechanical and electrical properties, materials characterization techniques

Approach:

- I. Qualitative
- II. Visualization/Application
- III. Quantitative

Reference &

Texts:

1. Foundations of Materials Science and Engineering by W.F. Smith, McGraw-Hill, Third edition, 2004.
2. Engineering Materials 1: An Introduction to Their Properties Applications: Ashby, Michael F. and Jones, David R., Butterworth-Heinemann
3. Engineering Materials 2: An Introduction to Microstructures, Processing & Design: Ashby, Michael F. and Jones, David R., Butterworth-Heinemann.
4. Introduction to Materials Science for Engineers: Shackelford, James F., Prentice Hall PTR.
5. The Principles of Engineering Materials, Barrett, Nix and Tetelman, Prentice Hall, Englewood Cliffs, NJ.



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Fall 2004: Schedule

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Week #	Date	Topic	Chapter #
1	August 23 (M)	Introduction to Materials Science and Engineering	1
	August 25 (W)	Atomic Structure and Interatomic Bonding	2
	August 27 (F)	Atomic Structure and Interatomic Bonding	2
2	August 30 (M)	The Structure of Crystalline Solids	3
	September 01 (W)	The Structure of Crystalline Solids	3
	September 03 (F)	Imperfections in Solids	4
3	September 08 (W)	Diffusion	5
	September 10 (F)	Diffusion/ Mechanical Properties of Solids	5, 6
4	September 13 (M)	Mechanical Properties of Solids	6
	September 15 (W)	Dislocations, Strengthening Mechanisms	7
	September 17 (F)	Dislocations, Strengthening Mechanisms	7
5	September 20 (M)	Failures in Metals	8
	September 22 (W)	Failures in Metals	8
	September 24 (F)	Review for Midterm I	
6	September 27 (M)	MID-TERM EXAMINATION I	
	September 29 (W)	Phase Diagrams	9
	October 01 (F)	Phase Diagrams	9
7	October 04 (M)	Phase Transformations in Metals	10
	October 06 (W)	Phase Transformations in Metals	10
	October 08 (F)	Applications and Processing of Metal alloys	11
8	October 11 (M)	Applications and Processing of Metal alloys	11
	October 13 (W)	Structures and Properties of Ceramics	12
	October 15 (F)	Structures and Properties of Ceramics	12

9	October 18 (M)	Fabrication and Processing of Glasses	13
	October 20 (W)	Polymer Structures	14
	October 22 (F)	Polymer Structures	14
10	October 25 (M)	Applications and Processing of Polymers	15
	October 27 (W)	Applications and Processing of Polymers	15
	October 29 (F)	Review for Midterm II	
11	November 01 (M)	MID-TERM EXAMINATION II	
	November 03 (M)	Composites	16
	November 05 (M)	Composites	16
12	November 08 (M)	Corrosion and Degradation of Materials	17
	November 10 (W)	Corrosion and Degradation of Materials	17
	November 12 (F)	Electrical Properties of Materials	18
13	November 15 (M)	Thermal Properties	19
	November 17 (W)	Magnetic Properties	20
	November 19 (F)	Optical Properties	21
14	November 22 (M)	Biological Properties (special topic)	
	November 24 (W)	Review for final examination	
15	November 29 (M)	Will be announced in class	
	December 01 (W)	Will be announced in class	
	December 08 (W)	FINAL EXAMINATION, 7:00 – 9:50 AM (Comprehensive & Mandatory)	

Special **FINAL EXAMINATION** session for those who may have conflict with other courses: **December 06, 2004 (M), 6:00 – 8:50 PM.**
