ROSE-HULMAN INSTITUTE OF TECHNOLOGY
ME 328 Materials Engineering
Winter 2005-2006

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Textbook: **Materials Science and Engineering: An Introduction**
William D. Callister, Sixth Edition

Objective: The overall goal of this course is for the student to acquire a working knowledge of the properties, uses, and advantages of commonly encountered engineering materials and to be able to apply this knowledge to solve materials problems in practice. The relationships between a material's structure, processing history, and mechanical properties will be emphasized. Properties such as strength, ductility, stiffness, and toughness will be defined in their engineering sense, and methods of determining these properties will be discussed.

Homework: Homework will be assigned approximately once each week but will not be collected or graded. Solutions will be posted.

Exams: A short (twenty minute) exam will be given once a week for a total of nine exams.

Project: A group project will be assigned that will require students to apply knowledge gained in class and thorough outside research to a critical analysis of material/ manufacturing for an application. Results will be communicated through a poster session or by a web page.

Grading:

Research Project	16%
Exams	54%
Final Exam	30%

How to Succeed:

To succeed in this course reading skills will be very important. Unlike Statics or Mechanics of Materials, there will be few equations and not much plugging and chugging. Instead you will be learning and applying information gleaned from lectures, the book, and handouts. Keep up with the reading and make sure you understand the assignments. Every field of knowledge has a common language, and you will find that learning the vocabulary is key to understanding the concepts.

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QUIZ	TOPICS	READING	PROBLEMS
1	Introduction to Materials Engineering	1.1-1.4	6.7, 6.29*,
	Mechanical Properties of Metals	6.1-6.12 (not 6.7)	6.47*, 6.D1,
	Failure: Fracture	8.1-8.6	8.11W, 8.12W,
	Failure: Fatigue	8.7-8.12	8.15, 8.22, 8.26,
Dec. 7	QUIZ 1		plus instructor's
2	Dislocations, Slip and Plastic	7.1-7.4, 7.6	7.5, 7.19, 7.20,
	Deformation	4.5-4.6	7.21, 7.29, 7.32,
	Mechanisms of Strengthening in Metals	3.2-3.4, 3.12-3.17	7.34, 7.35, 7.36,
	Recovery, Recrystallization and Grain	7.8-7.10	7.D4, 7.D7
	Growth	7.11-7.13	
Dec. 14	QUIZ 2		
3	Phase Diagrams	9.1-9.15	9.5 a, b, c, d
	The Iron-Carbon System	9.17-9.19	9.7 a, b, c, d
Dec. 21	QUIZ 3		9.21, 9.36, 9.47
			9.48, 9.49, 9.54
4	Microstructural Changes in Fe-C Alloys	10.5-10.9	10.11, 12, 14 a, b,
	Thermal Processing	11.7-11.9	d,e,f, 28,30,31,
Jan. 11	QUIZ 4		37, 38, D8, D16
5	Ferrous Alloys	11.1-11.2	11.3, 6, 7, 13, 16,
	Nonferrous Alloys	11.3	D6
Jan. 18	QUIZ 5		
6	Ceramic Structures and Properties	12.8-12.11	12.37, 44, 13.12,
	Applications and Processing of Ceramics	Handout & 13.8	20 plus
Jan. 25	QUIZ 6		instrustor's
7	Polymer Structure	14.1-14.12	14.25,27, 15.7,
	Mechanical Properties of Polymers	15.1-15.14	11, 12, 33, 47,
Feb. 1	QUIZ 7		49, 16.42 plus
8	Polymer Processing	15.15-15.24	
Feb. 8	QUIZ 8		
9	Composites	16.1-16.15	16.8, 24, D2,
	Corrosion	17.1-17.10	17.1, 10, 25, 26
	Degradation of Polymers	17.11-17.13	
Feb. 15	QUIZ 9		
	Material Selection		
	Evaluations		

Section numbers in the text followed by a "W" (those with a mouse icon) should be considered supplemental.

*Additional parts have been added to these problems by the instructors. These and one additional homework question will be distributed in class.