ME / MSE 6796

Structure-Property Relationships in Materials

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TEXT

Book chapter by Lackey and Starr on CVI
Book chapter by Lackey on Carbon-Carbon Composites

Lee, **Ceramic Microstructures: Property Control by Processing**:	
Chapters 1, 2, 6 & 9	read entire chapters
Chapters 3, 4, 8	omit, but I will lecture some on Chapters 3 & 4
Chapter 5	read pages 255 to top of 290 (omit from page 290 to end of chapter)
Chapter 7	read page 388 - 432 (omit page 433 to near bottom of page 437); read page 438 to end of chapter

Murray, **Introduction to Engineering Materials**- read pp. 209 - 297 and pp. 371 - 418

PREREQUISITES

Graduate Standing

PURPOSE AND GOALS

This course is primarily intended for non-materials majors, but is also appropriate for MSE majors. For non-MSE students, the course will provide a background in materials and may serve as part of the program of study for a minor in materials. For MSE students, the course will prepare students for future in-depth courses.

The interrelationships between processing, microstructure, and properties will be described for ceramics, metals, polymers, and composites, but ceramics will be emphasized. A goal is to provide information helpful in manufacture, selection, and understanding the performance of materials as well as provide a knowledge base conducive to conceiving new materials and advanced processing methods.

T O P I C S

Materials	Processes
metal alloys	cold pressing and sintering
steels	hot pressing
polymers	HIPing
traditional ceramics	slip casting
advanced ceramics	sol-gel
glass-ceramics	coating
fiber-reinforced composites	rapid solidification
nanocrystalline materials	precipitation hardening
silicon carbide	chemical vapor deposition
silicon nitride	chemical vapor infiltration
aluminum oxide	single crystal growth
zirconium oxide	

R E F E R E N C E S

1 Handbooks in library such as those of ASM International (in Reference Section)
2 *The Macrogalleria*, http://www.psrc.usm.edu/macrog/index.html
3 *Metal Supplies Online*, http://www.suppliersonline.com
4 Michael Barsoum, Fundamentals of Ceramics, McGraw-Hill, New York, 1997
5 David W. Richerson, *Modern Ceramic Engineering- Properties, Processing, and Use in Design*, Marcel Dekker, Inc., New York, Second Edition, 1992
6 James S. Reed, *Principles of Ceramic Processing*, John Wiley & Sons, New York, 1995
7 W. D. Kingery, *Introduction to Ceramics*
8 Tomsia, *Ceramic Microstructures: Control at the Atomic Level*, 1998

G R A D I N G

Presentations... 15% Two Exams ... 45% Final Exam ... 40%

For all assigned reading material, you are responsible for material in the text even if not covered in class. You are also responsible for material covered in class but not in text.

When preparing written reports, do not cut and paste text from the web. Treat web material as you would a book or journal article, i.e. paraphrase rather than copy. OK to copy and paste illustrations, photos, and micrographs from the web; remember to reference them.

Questions and Class Participation are S T R O N G L Y encouraged !!!