# WEEK # TOPIC AREA/ACTIVITIES

-Historical perspective continues Jan. 15.

#2 (Jan. 20, 22) | II.(a) Crystal Structures and Crystal Chemistry Application Examples for:
(a) Metals & Alloys
(b) Oxides (ceramics) and other mineral systems
(c) Semiconductors
Superconductors

#3 (Jan. 27, 29) | II.(b) " " (Topics continue)

#4 (Feb. 3, 5) | II.(c) " " (Topics continue)

#5 (Feb. 10, 12) | III.(a) Materials Physics: Defects and Microstructure Control

#6 (Feb. 17, 19) | III.(b) Defects and Microstructure Control: Contemporary Applications (Metals, Ceramics, Polymers, Semiconductors) (First paper due Feb. 19, 2004).

#7 (Feb. 24, 26) | IV.(a) Structure - Property Relationships: Tensors in crystals and materials properties as tensors.

#8 (Mar. 2, 4) | IV.(b) Structure - Property Relationships - Contemporary Examples (Mid-Semester Exam, Mar. 2, 2004)

#9 (Mar. 9, 11) | IV.(c) Structure - Property Relationships - Contemporary Examples: Composites including polymers and simple polymer systems (2nd paper due Mar. 11, 2004)

#10 (Mar. 23, 25) | V.(a) Phase Equilibria and Kinetics in Contemporary Materials Systems - Concept of a Materials System/Phases and Interfaces

#11 (Mar. 30, Apr. 1) | V.(b) Thermodynamics and Kinetics: Phase Transformations in Contemporary Materials

#12 (April 6, 8) | VI.(a) Modern Materials Synthesis & Processing Issues

#13 (April 13, 15) | VI.(b) Materials Processing & Performance Issues & Examples (3rd paper due April 15)

#14 (April 20, 22) | VI.(c) Materials Design and Simulation; including environmental consciousness, sustainable materials

MASE 6400/MME 5403: COURSE ASSIGNMENTS & GRADING

Academic Philosophy
It will be assumed that students have had some background in materials science, materials selection, physical metallurgy, etc. so that crystal structures, defects, modern tools for characterization, etc. are not a complete mystery. While certain fundamentals will be reviewed, the course will attempt to illustrate how fundamentals are utilized in the development and utilization of modern materials, and how new concepts are being developed and applied. This is an exploratory course. It is intended to elicit the involvement of students in researching contemporary materials areas. Consequently homework exercises will be developed to accomplish some of these features along with written reports/theses dealing with specific issues in materials science and engineering. These exercises will therefore constitute a prominent part of the course expectations (grading). Since writing is an essential part of effective communication and "communication" is an essential part of effective learning, written reports in this course will be very important.

TOPICAL PAPERS (3 TOTAL) - Due as Indicated
Paper #1 (Due Feb. 19, 2004): COURSE TOPICS I & II
Paper #2 (Due Mar. 11, 2004): COURSE TOPICS II, III & IV
Paper #3 (Due April 15, 2004): COURSE TOPICS IV, V, VI

Reports should be typed double space with 8 pages minimum type. Figures and drawings should be included where appropriate but should be adequately referenced. This means that when you use graphics/photographs, etc. from someone else or from another source, it is mandatory to acknowledge the source.

Reports should generally include the following components:

- Table of Contents
- Introduction/Historical Perspective
- Narrative: Concepts/Approaches
- Summary/Conclusions
- References/Bibliography
- Supporting Figures/Diagrams with Captions or Descriptions.

QUIZZES/EXAMS
- A Quiz will be given during the first class period to ascertain background and general preparation. A Second, unannounced quiz will be given sometime during the course after mid-Semester. The student can either apply the first day quiz grade or the unannounced quiz grade to the final grade, whichever is highest. An additional quiz will also probably be given as well.
- Mid-Semester Exam (closed-book)
- Final Exam (Open book to be distributed the last day of class and due May 6, 2004 at Noon).

HOMEWORK
- Assignments will be made on Thursday of each week and are due Thursday the following week. Late homework will not be accepted unless by prior approval (prior to the date due) or a medical or other emergency occurs. Homework will be discussed each Thursday beginning Jan. 29, 2004. There will probably be a total of 10 assignments during the semester. HOMEWORK IN SLOPPY, HANDWRITTEN FORM WILL NOT BE ACCEPTABLE.

GRADING
QUIZ (2 or more) (either preliminary or unannounced) - 10%
HOMEWORK - 25%
3 PAPERS - 10% each (30%)
MID-SEMESTER EXAM (closed book) - 15%
FINAL EXAM (open book) - 20%
Course Number: MASE 6400/MME 5403
Course Name: Modern Concepts/Mat. Sci. Engr.

Core (Required) Yes/No
Semester/Instructor Spring/Dr. Murr

Laboratory Component: Yes/No
Project/Paper 3

Course content as related to the Materials Criteria are indicated by level: High (H), Medium (M), or Low (L). Core courses are designed to address all criteria in the aggregate, but no course is expected to address all criteria at a high level.

<table>
<thead>
<tr>
<th>Outcome Criteria</th>
<th>Level</th>
<th>Comments/Relevant Activities</th>
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<tbody>
<tr>
<td>A. Materials Structure</td>
<td>H, M, L</td>
<td>Basic To Advanced</td>
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<tr>
<td>B. Material Properties</td>
<td>H</td>
<td>Properties as tensors</td>
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<tr>
<td>C. Materials Processing/Syn.</td>
<td>L</td>
<td></td>
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<tr>
<td>D. Materials Performance</td>
<td>M</td>
<td></td>
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<tr>
<td>E. Materials Types</td>
<td>H</td>
<td>ALL</td>
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<tr>
<td>F. Materials Characterization</td>
<td>M</td>
<td>Special emphasis on SEM, PEM, etc.</td>
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<tr>
<td>G. Oral/Written Communication</td>
<td>M</td>
<td>3 reports/papers</td>
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<tr>
<td>H. Materials Research</td>
<td>M</td>
<td>Reports/papers tied to research</td>
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