

Fall 2012**Dept. of Manufacturing System Engineering and Management
MSE 227 – Materials Engineering (Class # 15042)****Time:** M/W, 9:30-10:45 AM, room JD3504**Instructor:** Lisa Reiner
Office: JD1130, **Office Hour: M/W 10:45-11:15 AM**
Email: l_reiner@yahoo.com lisa.r.reiner@csun.edu
Website: http://www.csun.edu/~bavarian/mse_227.htm
Phone: (818) 677-7746**Textbook:** David G. Rethwisch and William D. Callister Jr,
Fundamentals of Materials Science and Engineering: An Integrated Approach, John Wiley & Sons, NY, **4th Edition, 2012.** <http://www.wiley.com/college/callister>**Tentative schedule:**

Date	Topic	Homework
Aug 27	Introduction	
Aug 29	Atomic Structure - Chapter 2	2: 18, 20, 22
Sept 3	Labor Day Holiday	
Sept 5	Crystal Structure - Chapter 3	3: 2, 3, 5, 7-10, 14, 21
Sept 10	Miller Indices - Chapter 3	3: 51-54, 62-66
Sept 12	Polymers - Chapter 4	4: 2-6, 13
Sept 17	Imperfections - Chapter 5	5: 1, 2, 3
Sept 19	Diffusion - Chapter 6	6: 4, 6, 7, 8, 11, 13, 16
Sept 24	Mechanical Properties - Chapter 7 (Oct 3)	7:
Sept 26	Exam #1 (Ch 2- 6)	
Oct 1	[go over Exam 1],	
Oct 3	Outline for technical paper due	Paper copy submitted in class; no emails
Oct 8	Strengthening Mechanisms- Chapter 8	8:
Oct 10	Failures - Chapter 9	9:
Oct 15, 17	Phase Diagram- Chapter 10	10:
Oct 22	Phase Transformation - Chapter 11	11:
Oct 24	Electrical Properties - Chapter 12	12:
Oct 29	Materials Applications, metals - Chapter 13	13:
Oct 31	Exam #2 (Ch 7- 11)	
Nov 5	[go over Exam 2]	
Nov 7	Processing - Chapter 14	14:
Nov 12	Veteran's Day Holiday	
Nov 14, 19	Composites - Chapter 15	15:
Nov 19	Technical Paper is due in class	No email submissions
Nov 21, 26	Corrosion - Chapter 16	16:
Nov 28		
Dec 3	Exam #3 (Ch 12- 16)	
Dec 5	[go over Exam 3]; review for final exam	
Dec 12	Final Exam - comprehensive	8:00 – 10:00 AM in JD3504

Last day to drop: Friday, September 14, 2012.

Three hours of lectures per week, Design units: 0.25

Prerequisites: Chem 101, Phys 220A, Phys 220AL

Corequisites: Math 150B

Course Description: An introductory course in engineering materials including metals, ceramics, polymers, and composites. Study of atomic and crystalline structures of materials. Application of basic principles to the study of mechanical, physical, and chemical behavior of materials. Selection of materials in engineering applications based on materials properties and processing.

Learning Objectives: To understand the principles of engineering and science in applications of materials and design. To learn to find information in literature and other available sources. To learn to use information systems (computer, internet, and other available sources) in engineering practice.

Methods of Student Evaluation: Three midterm examinations, one final examination, weekly homework assignments, class attendance and term paper.

Course Method and Expectations: The main techniques used in this course center on the application of scientific principles to real-life situations. Library research is necessary to fully understand and assimilate the concepts discussed in class lectures. Homework assignments are an essential part of learning.

Grading Policy: A through F with Plus/Minus Grading.

Term Paper	15 %
(3) Midterm Exams (1.25 hrs)	60 %
Final Exam (2 hrs)	25 %

Exams will be based on lecture and text book material (example questions and assigned homework). All exams will be closed book, no notes, individual effort. Equations will be provided. No cell phones or other personal communication devices are permitted during exams.

Study Suggestions:

1. Read the relevant material in the book
2. Review and understand the examples given in the book.
3. Do the assigned homework.
4. Work additional problems if you are having difficulty with a particular concept.
5. Come to office hours.

MSE 227 Design Project:

Option 1: Materials Application

The purpose of this report is to analyze the behavior of specific materials for a specific use. It is expected that this report will build upon course material and is at a technical difficulty of someone with a working knowledge of MSE 227.

Option 2: Materials Selection Report

The purpose of this report is to analyze material requirements in a specific design and to compare the behavior of candidate materials. The report should include the basis for selection in terms of the design, the selection criteria, comparison between materials behavior, and specification of the material for purchase.

Guidelines for Term Paper

Basic Format to include 1-paragraph Abstract; Introduction/Background information; Material properties, Processing Techniques, Applications, Results; Discussion & Conclusions; list of references.

- **Single spaced with 1-inch margins.** Roughly 8-10 pages long; content more important than length.
- **Include figures and tables. All figures and tables MUST have appropriate captions.**
- **All references must be appropriately cited in the text and listed at the end of the paper.**
- **You must use at least 5 references from a variety of sources other than the Callister/Rethwisch text book** (reference books, journals, engineering magazines, internet).
- **Paper copy is due in class November 19, 2012.**

Topics for the Term Paper

1. Aluminum foam or titanium foam
2. Noise attenuation/reduction/cancellation materials
3. Graphene materials
4. MEMS
5. Thin film materials
6. Ni-based superalloys (shape memory alloys)
7. High temperature polymers
8. Optical coatings (AR, thermal reduction)
9. Polymer coatings for biosensors
10. Flexible fiber optics
11. Flexible (bendable) metallic glass
12. Titanium diboride
13. Advanced fiber reinforced composite materials (no concrete/cement materials)

Engineering College Statement

Engineers uphold and advance the integrity, honor and dignity of the engineering profession by:

- using their knowledge and skills for the enhancement of human welfare,
- being honest and impartial, and serving with fidelity the public, their employers and clients;
- striving to increase the competence and prestige of the engineering profession; and
- supporting the professional technical societies of their disciplines.

Engineers shall:

- hold paramount the safety, health and welfare of the public in the performance of their professional duties
- perform services only in the areas of their competence
- issue public statements only in an objective and truthful manner
- act in professional matters for each employer or client as faithful agents or trustees, and avoid conflicts of interest
- build their professional reputation on the merit of their services, and not compete unfairly with others
- act in such a manner as to uphold and enhance the honor, integrity and dignity of the profession
- continue their professional development throughout their careers and provide opportunities for the professional development of those engineers under their supervision

1. **Class members are expected to submit original work except in joint projects in which the activities are cooperative and collaborative.**
2. **Class members are expected to attend class except when circumstances are outside the member's control.**
3. **Class members are responsible for material in the reading assignments, class presentations, discussions, and homework examples.**
4. **Homework sets and project reports are due at the time requested**
5. **Class members are expected to be cooperative with other class members and to collaborate when appropriate with colleagues.**
6. **Class members are expected to participate in the oral presentations as required.**
7. **Class members are expected to comply with University regulation governing intellectual property, origin of work, and honesty. Failure to maintain these standards will result in student disciplinary action and a grade of F in the course.**