EGEN 213 – Introduction to Metallurgical and Materials Engineering  
(formerly M&ME 2020)  
Spring 2012  
M W F 1:00-1:50  
SEB 113

Course Outline

Instructor: Dr. Al Meier - ELC 212  
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The lecture notes are the main source of information for this course and the text is intended to be a supplementary source of information.

Credits: 3 Credit Hours -Lecture

Prerequisite: CHMY 143 (CHEM 1066) or consent of instructor.

Goals: This course is required for the BS degree in General Engineering, Civil and Mechanical Engineering Options. The goal is to provide engineering majors with a broad introduction to metallurgical and materials engineering with an emphasis on the materials engineering tools and concepts used in mechanical and civil engineering applications. There are 3 major objectives for this course:

1.) To introduce the basic bonding and structure for metals, polymers and ceramics; and to relate the differences in structure to the observed mechanical behavior and physical properties.

2.) To apply the concepts of process flow diagrams, material balances, and energy balances to process engineering and production.

3.) To introduce some of the important properties and processing methods for key structural materials in each of the major material systems: metals, polymers, ceramics, and composites.
Tentative Lecture Topics:

I. Introduction ~2 lectures
II. Material Structures ~6 lectures
   - Bonding
   - Crystal Structures
   - Amorphous Structures
III. Mechanical Properties ~6 lectures
IV. Material Processing ~7 lectures
    - Process Flow Diagrams
    - Material Balances
    - Energy Balances
V. Phase Diagrams ~3 lectures
VI. Materials Classes ~15 lectures
    - Metal Alloys
    - Polymers
    - Ceramics and Glass
    - Composites
VII. Corrosion ~2 lectures
Exams I-III ~44 lectures

Office Hours: Tues. 11:00-12:00
            Wed. 2:00-3:00
            Thurs. 11:00-12:00
            By Appointment

I have an open door policy. If I am in my office, feel free to stop in and ask questions about the class or any other materials questions you may have. If you would like to meet at another time, please send me an email with several available times.

Attendance: Attendance is not mandatory but it is necessary. I will only take attendance for the first 2 lectures in order to verify the class lists. If you miss class, it is your responsibility to make sure that any homework assignments due for that class period are submitted, to obtain any missed notes from your classmates, and to pick up any new assignments or handouts. It is also your responsibility to attend the scheduled exam times. Please see me in advance if you know that you will not be able to attend the regularly scheduled test time. Excused absences will only be granted after an absence for unusual circumstances.

Cell Phones: Cell phone usage has become a serious distraction. Cell phones are not permitted in class. If I choose to bring a cell phone to class, it must be turned off and stored out of view. If a cell phone is seen or heard during class, it will be confiscated for 1 week (and returned at the end of class on the 7th day).
Exam Schedule: The exams are tentatively scheduled for the following times:

- Exam I: Wed. Feb. 15: In-class
- Exam II: Wed. Mar. 21: In-class
- Exam III: Wed. April 18: In-class
- Exam IV/Final Exam: Wed. May 9: 8:00-10:00 AM

If you have a schedule conflict with these times, it is your responsibility to see me in advance to reschedule. Exams missed without prior arrangements will be penalized 50% on the make-up exam.

Grading: The grade will be based on the four section exams, a final exam, and homework problem sets.

- Homeworks (~10-12) 100 pts
- Exam I 100 pts
- Exam II 100 pts
- Exam III 100 pts
- Exam IV 100 pts
- Final Exam (cumulative) 100 pts
- Total 600 pts

The grades are based starting with standard percentiles (60, 70, 80, and 90%) with a curve downward to account to more challenging homework and exam problems. I generally do not assign “+” and “−” grades. I would be glad to discuss my grading policies with you individually. I understand that grades are important but I do not want to make them a focus of this course.

Exams: Exams will be closed book and closed notes. I will provide a formula sheet. You will need to bring a basic, non-programmable calculator with log, trig, exp, and power functions. The calculator cannot have solve or integration functions, and it cannot have any memory storage (especially alphanumeric). If you are unsure about your calculator, have it checked in advance. You can also bring colored pencils and a ruler to the exam. I will provide exam outlines prior to the exam.
**Homework**: There will be regular homework in the form of problem sets. While the homework is a relatively small amount of the total grade (~17%), the completion and understanding of the homework will help to keep you up to date on the course material and will help you to prepare for the exams. The homework will consist of three types of questions:

1.) Basic definitions to help with reviewing the notes.
2.) Problems related to lecture.
3.) Problems beyond the scope of the lecture requiring additional thought.

Homework problems may be beyond the level expected for exams. However, the homework problems should still be helpful in preparing for the exam. Anything in the notes is also fair game for the exams.

Homework is due at the start of class (1:00). Solutions sets will be posted in a folder outside of ELC 212. Late homework will be penalized 20% prior to posting of the solution sets and 50% after the solution sets are posted. There may also be practice problem sets that will not be collected or graded but solution sets will be posted.

You will always have at least one week to complete a homework assignment. However, there may be overlapping homework assignments. The homework sets will vary size and difficulty depending on whether a given topic lends itself to homework problems. Working with other students on the homework is highly recommended as it provides an opportunity to exchange ideas. However, each student must turn in his or her own work. All assignments should be neat with justifications for all steps and calculations for problems. If you work with a spreadsheet, sample calculations should be provided along with a page from the spreadsheet verifying the matching result. Everyone must generate their own spreadsheets and figures.

**Special Accommodations**: If you have a documented learning disability and need extra test time or other accommodations, please see me and I will make my best to accommodate your needs.

**Academic Dishonesty**: In general, academic dishonesty will not be tolerated. You will be practicing engineers in a few years. Integrity and competence are critical to your professional success. Developing bad habits in college will hinder your professional development and will weaken the prestige of your degree.