Course Outline

Instructor: Dr. Al Meier - ELC 212  
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Computer Software: CES EduPack 2010 Design Software. We will be using this software throughout the semester. It can be used as a materials database, a processing database, and a materials selection tool. It is installed on 9 computers in the metallurgy computer lab (ELC 114) and on the computer in my office.

Credits: 2 Credit Hours - Lecture

Prerequisite: EMAT 352 (M&ME 3510) or consent of instructor.

Goals: This course is a required course in Metallurgical and Materials Engineering. The major goal is to provide an introduction to materials selection and materials processing in relation to the design process. There are several objectives for this course:

1.) To introduce the parameters that are important to design, to understand how they are interrelated, to understand how they relate to the materials selection process, and to use these concepts in composite design.

2.) To introduce some of the key materials in each of the major materials groups (metals, ceramics, and polymers).

3.) To introduce the common material fabrication methods and to relate them to the design parameters and manufacturability as part of the materials selection process.

4.) To develop the ability to use modern software (CES EduPack) in the materials selection and design process.

5.) To develop the ability to obtain materials property and processing data needed in the materials selection and design process from both handbooks and electronic sources.
Tentative Lecture Topics:

I. Introduction
II. Design
   - Materials Selector Software
   - Geometry
   - Multiple Constraints
   - Safety Factors
III. Materials Selection
   - Polymers (~6 lectures)
      - Thermoplastics
      - Thermosets
      - Elastomers
   - Metal Alloys (~9 lectures)
      - Steel
      - Aluminum
      - Stainless Steel
      - Magnesium
      - Titanium
      - Copper
   - Ceramics (~4 lectures)
      - Structural
      - Electronic
      - Glass
IV. Fabrication Methods (Manufacturability)
Exam I

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: I will only take attendance for the first 2 to 3 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 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.
Exam Schedule: The exams are tentatively scheduled for the following times:

- Exam I
  Thurs. Mar. 8: In-class
- Exam II
  Tues. May 8: 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 two exams, projects, and homework problem sets. A large weight will be given to projects and homework sets. This is the second offering of this course by this instructor and the total number of homework assignments and projects has not been determined.

<table>
<thead>
<tr>
<th>Homeworks (~5-7)</th>
<th>50-100 pts</th>
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</thead>
<tbody>
<tr>
<td>Projects (1-2)</td>
<td>100-200 pts</td>
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<tr>
<td>Exam I</td>
<td>50-100 pts</td>
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<tr>
<td>Exam II (non-cumulative)</td>
<td>50-100 pts</td>
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<tr>
<td>Total</td>
<td>~250-450 pts</td>
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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: The exams will be approximately 50 min and 60 minutes long and will be based on material covered in lecture. 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. If you are unsure about your calculator, have it checked in advance. I will allow extra time for any students who need it. You can also bring colored pencils and a ruler to the exam. I will provide exam outlines prior to the exam.

Homework: This course is a materials engineering core course. There will be homework in the form of problem sets and projects. The projects will focus on materials selection and design and will frequently include using the materials selection software, or library and web research. The homework will typically be shorter assignments related to the material being covered in lecture.

When information is provided from outside sources (handbooks, textbooks, web pages, computer software, interview), full references should be provided. I will hand out a set of typical citations with the first class assignment.
All assignments are due at the start of class (9:30). Many of the assignments will be based on design and selection and therefore will have open-ended solutions. In these cases, I will not post solutions but I would be glad to discuss them with you. For problems sets involving calculations or specific solutions, 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 or after I have discussed the solutions. Prior to the exams, practice problem sets may be assigned. The problem sets will not be collected or graded but solution sets will be posted, when appropriate.

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.