EMEC 250: Mechanical Engineering Materials

Catalog Data
Properties of metallic, ceramic, and polymeric materials as related to their structures. Material selection for engineering applications. (for ME majors)

Textbook

Instructor
Dr. Stephen Sofie, Roberts Hall 312 ssofie@me.montana.edu (office hours posted outside office)

Entrance Expectations
PREREQUISITE: CHMY 121 or CHMY 141
COREQUISITE: M165Q or M171Q

Students are expected to be familiar with basic chemistry and the characteristics of solid and liquid states of matter. This course requires completion of regular homework assignments, group laboratory exercises and reports, as well as sufficient performance on written examinations.

Course Objectives
EMEC 250 is designed to introduce students to the fundamentals of materials science and engineering. The course will cover bonding, structure of solids and atomic packing, imperfections in crystals, electrical and thermal properties of solids, phase diagrams and development of microstructure, mechanical properties of solids (ie. polymers, metals, and ceramics), processing and applications of the different classes of materials.

Course Outcomes
Upon completion of this course, students will have demonstrated the ability to:
1. Calculate lattice spacings, nearest neighbor distances, and atomic packing fractions in the 7 bravais lattice arrangements.
2. Demonstrate the ability to identify the role of imperfections in the structure of solids.
3. Define the electrical and thermal properties of metals, ceramics, and polymers.
4. Understand how to read a binary phase diagram and predict microstructure based on composition and temperature.
5. Interpret mechanical behavior data in the development of stress/strain curves and identify the influence of thermal treatment.
6. Identify the fundamental methods of processing metals, ceramics, and polymers and the general application roles for the 3 classes of materials.
Schedule
Course schedule is posted and updated regularly on D2L

Course Website
All course information will be posted on Desire2Learn (D2L). D2L announcements and MSU email accounts will serve as the official university means of communication. Per MSU policy, students are expected to check their email at least twice weekly to stay current with University-related communications. Certain communications (e.g. scheduling) may be time-sensitive. Failure to process your email effectively is not an acceptable excuse for missing official communications.

Special Needs Information
Students with special needs or requiring special accommodations should contact the instructor or the campus Disabled Student Services Office at (406) 994-2824 at their earliest opportunity.

Student Conduct
Students are expected to conduct themselves in accordance with the MSU Student Conduct Guidelines with particular attention to the areas of academic honesty, behavior, and responsibilities. As mentioned above and in conjunction with Section 310 of the Student Handbook, students are expected to be prompt and prepared for class. Late work will not be accepted.

Assessment and Evaluation
The course outcomes will be evaluated based upon homework assignments, writing exercises, midterm exams and the final letter grades will be weighted as follows:

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<tbody>
<tr>
<td>Exams (3)</td>
<td>75%</td>
<td>(2 midterms and a final)</td>
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<tr>
<td>Homework</td>
<td>25%</td>
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Exams missed due to unexcused absences cannot be made up. If you know in advance that you must miss any exam, notice must be made PRIOR to the week of the exam. Three equally weighted exams will be administered according to the class schedule with the final exam scheduled according to the registrar. Homework and lab reports must be turned in on time. The lowest lab report and homework grade will be dropped. Late homework will not be accepted. Point totals required to receive a particular letter grade will be determined by the instructor at the conclusion of the course, and the use of plus and minus grades will be at the discretion of the instructor. Inappropriate conduct, late arrival to lecture, poor group performance, class participation, cheating, and plagiarism will affect the final grade.