ET2200 - Engineering Materials  
(Fall 2009)

Instructor:  
Gopikrishna Neelam  
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Ph: 586-201-9012

Time:  
Mondays & Wednesdays @ 5:30 PM

Course Description:  
Application and characteristics, both physical and chemical, of metallic and nonmetallic materials, polymers and composites used in industry. The primary process involved in producing these materials will be discussed.

Pre-requisites: None

Co-requisites: CHM1020

Textbook and Other Required Materials:  

Topic Covered:  
1. Introductions  
2. Atomic structure and periodic table  
3. Molecular structure and bonding  
4. Review of metal, polymers, ceramics, glass, wood and composites  
5. Structure of solid materials crystallography  
6. Crystal imperfections, impurities and defects  
7. Phase and phase diagrams  
8. Physical and mechanical properties of materials; factor and safety  
9. Chemical Properties- Degradation, oxidation and corrosion  
10. Metal thermal processing equilibrium condition  
11. Heat, quench and temper process  
12. Ferrous and non-ferrous metals  
13. Polymerization  
14. Plastics mechanical and chemical properties  
15. Elastomers, adhesives, wood  
16. Ceramics, structure bonding and properties  
17. Ceramic processing
**Course Learning Objectives:**

Upon completion of this course, students should be able to:

1. Evaluate both the physical and chemical characteristics of metallic and nonmetallic materials
2. Describe the applications of metallic and nonmetallic materials in industry
3. Explain and interpret the advance materials, such as polymers and composites
4. Describe the primary processes involved in producing various materials
5. Interpret and translate the various material properties into design perspective

**Grading Policy:**

**Assessment:**
- Quiz: 40%
- 2 exams @ 20 points each: 40%
- Individual Project: 20%
- Total: 100%

No extra credit assignments will be given. Your absolute score decides your grade.

**Instructor's Grading Criteria**

<table>
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<tr>
<th>Score Range</th>
<th>Grade</th>
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<tbody>
<tr>
<td>95 - 100</td>
<td>A</td>
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<tr>
<td>90 - 94</td>
<td>A-</td>
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<tr>
<td>87 - 89</td>
<td>B+</td>
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<td>84 - 86</td>
<td>B</td>
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<td>80 - 83</td>
<td>B-</td>
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<td>C</td>
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<td>70 - 73</td>
<td>C-</td>
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<td>69</td>
<td>F</td>
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**Remarks:**

1. We will have the quiz at the beginning of the class.
2. Quiz/exams are open book. Make up exams would be given only under extenuating personal circumstances and should get an approval from the instructor.
3. Any disagreement regarding a score on an assignment or examination must be submitted with a written explanation of the perceived error within one week of the return of the item in question to the student. In such cases, the entire item will be re-graded with possible adjustment of the score in either direction.
4. Regular class attendance and participation is highly advised.
5. Collaboration during studying is encouraged.

**Contributions to MCT Program Outcomes:**

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<tr>
<th>BSET-MCT Program Outcomes</th>
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<tr>
<td>√ 1. A firm foundation in mathematics and sciences required for the understanding, application, and development of mechanical engineering technology principles</td>
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<td>√ 2. Technical expertise in engineering materials, statics, dynamics, strength of materials, fluid power or fluid mechanics, thermodynamics, and instrumentation electronics.</td>
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<td>3. Technical expertise having added technical depth in manufacturing processes, mechanical design, and fluids and thermal sciences.</td>
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4. Expertise in applied mechanics, plus added technical topics in physics and inorganic chemistry.

5. The ability to communicate effectively in oral, written, visual, and graphical modes in both interpersonal and group environments.

6. The attitudes, abilities, and skills required to adapt to rapidly changing technologies and the ability to pursue life-long learning.

7. An understanding of all aspects of the design process and project management including functional and esthetic considerations.

8. A well-developed sense of ethics, global issues, professional and social responsibility and a respect for diversity.

9. The skills and attitudes necessary to work successfully as a member of a team.

**Policy on cheating:**
Cheating is defined by the University as “intentionally using or attempting to use, or intentionally providing or attempting to provide, unauthorized materials, information, or assistance in any academic exercise.” This includes any group efforts on assignments or exams unless specifically approved by the instructor for that assignment/exam. Evidence of fabrication or plagiarism, as defined by the University in its brochure *Academic Integrity*, will also result in downgrading for the course. Students who cheat on any assignment or during any examination will be assigned a failing grade for the course, independent of the earlier grades in the course and may be subject to additional penalties.