Fall Semester 2017

COURSE: Materials Science and Engineering 201
TITLE: Phases and Phase Relations
LEVEL: Undergraduate
CREDIT: 3 hours lecture; 3 semester hours
TIME: TR 9:30-10:50 AM
LOCATION: 218 Ceramics Building

DESCRIPTION: Introduction to bonding, crystal structures, phase equilibria and microstructure. Quantitative examination of phases (crystalline and non-crystalline structures) and the relationships between phases (phase diagrams and phase transitions).

INSTRUCTOR: Cecilia Leal
Office: 201c MSEB
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Email: cecilial@illinois.edu

OFFICE HOURS: Mondays 4:30-6:30 pm at MSEB 205A

TEACHING ASST: TBD, email: TBD@illinois.edu

PREREQUISITES: CHEM 104, MATH 241, MSE 182, and PHYS 212

ASSESSMENT: Problem sets (5-10) 20%
i>clicker sessions 10%
2 mid-semester exams, 1 hr. 40%
Final, comprehensive exam, 3 hrs. 30%


LECTURE Notes and Recording: Compass2g http://compass2g.illinois.edu

TENTATIVE MIDTERM SCHEDULE

Midterm Exam No. 1 Tuesday, October 5, 10:00-10:50 AM, 218 Ceramics Building
Midterm Exam No. 2 Thursday, November 9, 10:00-10:50 AM, 218 Ceramics Building

FINAL EXAM 1:30-4:30pm, Friday, December 15, 218 Ceramics Building
TENTATIVE TOPIC SCHEDULE

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<th>Topic</th>
<th>Duration</th>
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<tr>
<td>Introduction</td>
<td>1.5 hours</td>
<td>Chapter 1</td>
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<td>Bonding</td>
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<td>Crystals and Crystal Structures</td>
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<td>Chapter 3</td>
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<td>Defects in Crystalline Solids</td>
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<td>Diffusion</td>
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<td>Polymer Structures</td>
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<td>Phase Diagrams</td>
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<td>Phase Transformations</td>
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<td>Chapter 11</td>
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<td>Processing of Materials</td>
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<tr>
<td>Intro to Mechanics</td>
<td>1.5 hours</td>
<td>Chapter 7</td>
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<td>Ethics in Science and Engineering</td>
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COURSE OBJECTIVES

- Understand the relationship between bonding and crystal structures
- Understand how the structure of different crystals is determined
- Learn the important differences between amorphous and crystalline solids
- Understand the types and importance of defects in crystalline solids
- Understand the relation between Gibb's phase rule and phase diagrams
- Understand how to examine materials properties using phase diagrams
- Understand the relationship between phase transformations, microstructure and properties

NOTES

- No calculators/devices will be necessary/allowed during exams
- Please register your i>clicker on compass2g!
- Discussion during i>clicker sessions are encouraged but answering on behalf of someone using their device is not permitted
- Class attendance is not required but is strongly recommended and may be mandatory on certain occasions
- Homeworks will be offered on PrairieLearn (https://prairielearn.engr.illinois.edu/) and you will have infinite attempts to provide the right answer.
  Two computational homeworks will be provided on compass 2g. Those will be graded by a computational TA. These will likely couple with regular homework assignments. If this is the case you will have more time to turn in both homeworks
- Homeworks must be completed by the due date at 5 pm.