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, CDT. Fully on-line, synchronous delivery. Recorded lectures will be available for asynchronous view.
LOCATION: Online via Zoom. Zoom link for synchronous delivery is available on compass2g (https://compass2g.illinois.edu/webapps/login/). Lecture notes and lecture videos will be available on compass2g.

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: 204 MSEB
Phone: 217-300-1955
Email: ceciliial@illinois.edu

OFFICE HOURS: Wednesdays from 5-7 PM, CDT on Zoom. Zoom link is in compass2g. More office hours available upon demand.

DISCUSSION FORUM: Questions related to MSE201 homeworks, exams, and all course contents should be posted in compass2g Question and Answer Forum.

TEACHING ASST: Devon Samuel, email: devonms2@illinois.edu

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

ASSESSMENT: Problem sets (5+2) 20%
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

Class attendance is not required but is strongly recommended and may be mandatory on certain occasions.

ASSESSMENT

1. HOMEWORKS

Homeworks (HW) will be offered on PrairieLearn (https://prairielearn.engr.illinois.edu/). You will have infinite attempts to provide the right answer. If you complete the HW late you get 30% up to a week late. Past that, you get no credit but you can still practice the HW. Homeworks
must be completed by the due date at 5 PM, CDT. Leaving HW to the last-minute results in overloading of the system and errors leading to late delivery of the HW. Do your homework early!

Two computational assignments will be provided on compass 2g. You will submit these assignments in the format of pdf to your TA. There will be a computational TA and office hours on Zoom (TBD) to assist you with those assignments. Grading of the computational assignments is however done by the “regular” course TA.

2. EXAMS

All exams will be performed at CBTF on-line (https://cbtf.engr.illinois.edu/cbtf-online/index.html) with proctoring by Zoom. The time and duration of the exam will be automatically adjusted to accommodate DRES and/or different time zones. (See more information below).

TENTATIVE MIDTERM SCHEDULE
Midterm Exam No. 1 Thursday, October 15, 9:30-10:50 AM, CDT
Midterm Exam No. 2 Thursday, November 12, 9:30-10:50 AM, CDT

FINAL EXAM 1:30-4:30 PM, CDT. Friday, December 18.

3. i>CLICKERS

i>clicker sessions will occur during synchronous delivery of class. Students are strongly encouraged to participate. We will use Zoom polling to collect answers, but no points will be collected.

i>clicker questions will then be posted on Prairie Learn and students can answer to obtain points. i>clicker questions will be made available after each class. Answers are due on the last day of class (December 8) but I strongly recommend that you do them gradually as they are posted after each class.

TENTATIVE TOPIC SCHEDULE

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<thead>
<tr>
<th>Topic</th>
<th>Time</th>
<th>Chapter</th>
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</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>1.5 hours</td>
<td>Chapter 1</td>
</tr>
<tr>
<td>Bonding</td>
<td>3 hours</td>
<td>Chapter 2</td>
</tr>
<tr>
<td>Crystals and Crystal Structures</td>
<td>5 hours</td>
<td>Chapter 3</td>
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<tr>
<td>Defects in Crystalline Solids</td>
<td>3 hours</td>
<td>Chapter 5</td>
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<tr>
<td>Diffusion</td>
<td>3 hours</td>
<td>Chapter 6</td>
</tr>
<tr>
<td>Polymer Structures</td>
<td>4 hours</td>
<td>Chapter 4</td>
</tr>
<tr>
<td>Intro to Mechanics</td>
<td>1.5 hours</td>
<td>Chapter 7</td>
</tr>
<tr>
<td>Processing of Materials</td>
<td>6 hours</td>
<td>Chapter 14</td>
</tr>
<tr>
<td>Phase Diagrams</td>
<td>4 hours</td>
<td>Chapter 10</td>
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<tr>
<td>Phase Transformations</td>
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<td>Chapter 11</td>
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<tr>
<td>Ethics in Science and Engineering</td>
<td>1.5 hours</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

**TENTATIVE SCHEDULE**

Aug 25, Introduction
Aug 27, Bonding 1, i-clicker survey, not for grade
Sep 1, Bonding 2
Sep 3, Crystals 1, HW1 assignment
Sep 8, Crystals 2
Sep 10, Crystals 3 HW1 due
Sep 15, Crystals 4,
Sep 17, Defects 1, HW2 assignment, computational 1 assignment
Sep 22, Defects 2
Sep 24, Diffusion 1
Sep 29, Diffusion 2, HW2 due, computational 1 due
Oct 1, Polymers 1, HW3 assignment
Oct 6, Polymers 2
Oct 8, Polymers 3, HW3 due
Oct 13, Mid Term 1 Prep
Oct 15, MidTerm1, CBTF on-line (https://cbtf.engr.illinois.edu/cbtf-online/index.html)
Oct 20, Ethics Class, mandatory
Oct 22, Mechanics, HW4 assignment
Oct 27, Processing
Oct 29, Phase Diagrams 1, HW4 due
Nov 3, Phase Diagrams 2, computational 2 assignment
Nov 5, Phase Diagrams 3
Nov 10, MidTerm2 Prep.
Nov 12, MidTerm 2, CBTF on-line (https://cbtf.engr.illinois.edu/cbtf-online/index.html)
Nov 17, Phase Diagrams 4 computational 2 due
Nov 19, Phase Diagrams 5
**Break**
Dec 1, Transformations 1, HW5 assignment
Dec 3, Transformations 2
Dec 8, Final Prep, HW5 due

Dec 18, Final, CBTF on-line (https://cbtf.engr.illinois.edu/cbtf-online/index.html)
CBTF online
This course uses the College of Engineering Computer-Based Testing Facility service CBTF Online for its exams.

The policies of the CBTF are the policies of this course, and academic integrity infractions related to the CBTF are infractions in this course.

If you have accommodations identified by the Division of Rehabilitation-Education Services (DRES) for exams, please email your Letter of Accommodations (LOA) to CBTF Manager Carleen Sacris at sacris1@illinois.edu before you make your first exam reservation. If you have any issue during an exam, please inform the proctor immediately. Work with the proctor to resolve the issue at the time before logging off.

Review all instructions on the CBTF website before your first exam: https://cbtf.engr.illinois.edu/cbtf-online/index.html

Diversity, Equity, and Inclusion Statement
The University of Illinois, the Grainger College of Engineering, the Materials Science and Engineering department, and MSE201 operate under the guiding principle that “Our entire community benefits when individuals from different personal, cultural, and disciplinary perspectives are working together.” (https://grainger.illinois.edu/about/diversity). MSE201 will be a safe and inclusive place for active learning with no tolerance for discrimination of any kind.

Academic Integrity Policy
The University of Illinois at Urbana-Champaign Student Code should also be considered as a part of this syllabus. According to the Student Code, “It is the responsibility of each student to refrain from infractions of academic integrity, from conduct that may lead to suspicion of such infractions, and from conduct that aids others in such infractions.”

Academic dishonesty may result in a failing grade. Every student is expected to review and abide by the Academic Integrity Policy: http://studentcode.illinois.edu/. Ignorance is not an excuse for academic dishonesty. It is your responsibility to read this policy to avoid any misunderstanding. Do not hesitate to ask the instructor if you are ever in doubt about what constitutes plagiarism, cheating, or any other breach of academic integrity.

See also this quick reference guide to academic integrity: https://provost.illinois.edu/policies/policies/academic-integrity/students-quick-reference-guide-to-academic-integrity/

Academic Accommodations
To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, you may visit 1207 S. Oak St., Champaign, call 333-4603 (V/TDD), or e-mail a message to disability@uiuc.edu. http://www.disability.illinois.edu. DRES accommodations will be implemented in the CBTF on-line.

Family Educational Rights and Privacy Act
Any student who has suppressed their directory information pursuant to Family Educational Rights and Privacy Act (FERPA) should self-identify to the instructor to ensure protection of the privacy of their attendance in this course. See https://registrar.illinois.edu/academic-records/ferpa for more information.

Sexual Misconduct Policy and Reporting
The University of Illinois is committed to combating sexual misconduct. Faculty and staff members are required to report any instances of sexual misconduct to the University’s Title IX and Disability Office. In turn, an individual with the Title IX and Disability Office will provide information about rights and options, including accommodations, support services, the campus disciplinary process, and law
enforcement options. A list of the designated University employees who, as counselors, confidential advisors, and medical professionals, do not have this reporting responsibility and can maintain confidentiality, can be found at https://wecare.illinois.edu/resources/students/#confidential
Other information about resources and reporting is available at: https://wecare.illinois.edu

Community of Care
As members of the Illinois community, we each have a responsibility to express care and concern for one another. If you come across a classmate whose behavior concerns you, whether in regards to their well-being or yours, we encourage you to refer this behavior to the Student Assistance Center (217-333-0050 or http://odos.illinois.edu/community-ofcare/referral/). Based on your report, the staff in the Student Assistance Center reaches out to students to make sure they have the support they need to be healthy and safe. Further, we understand the impact that struggles with mental health can have on your experience at Illinois. Significant stress, strained relationships, anxiety, excessive worry, alcohol/drug problems, a loss of motivation, or problems with eating and/or sleeping can all interfere with optimal academic performance. We encourage all students to reach out to talk with someone, and we want to make sure you are aware that you can access mental health support at the Counseling Center (https://counselingcenter.illinois.edu/) or McKinley Health Center (https://mckinley.illinois.edu/). For mental health emergencies, you can call 911 or walk in to the Counseling Center, no appointment needed.