MSE 360: Kinetic Processes in Materials

Time: 10:15–11:30am | Days: Tu Th | Room: 01021 EB2

Spring 2017

Instructor: Dr. Yuntian Zhu (ytzhu@ncsu.edu), 308 RBII, (919) 513-0559
Office Hour: by appointment

Course Textbook: Porter, Easterling and Sherif, Introduction to Phase Transformations in Metals and Alloys. 3rd edition. CRC Press, 2008. You will need to have an individual copy because of reading assignments.


Course Description (from Catalog): Types, mechanisms, and kinetics of solid-state phase transformations are presented with selected applications of solid-state transformations. Mechanisms of diffusion and techniques for diffusion calculations are discussed.

Course Objectives: By the end of the course, you should be able to do the following things:

1. Apply basic principles of thermodynamics to phase transformations where interactions occur at different size scales: micro through nano
2. Define and describe various mechanisms of diffusion in materials
3. Solve diffusion-related mathematical problems in material science
4. Explain the thermodynamics and kinetics of vapor-solid, liquid-solid, solid-solid phase transformations in materials
5. Apply the principles of phase transformations to material engineering processes
6. Identify and describe effects of bulk, strain and surface energy in changes of state and structure, particularly over nanoscale dimensions or reduced dimensions
7. Describe Diffusional and Diffusionless Transformations

POLICIES AND PROCEDURES

Homework collaboration policy: You can discuss the homework and help each other to understand the problem and to develop an approach to solve the problem. You have to solve the problem individually. If N students have the exactly same steps to reach the same answer to a problem, each student will get 100%/N credit.

• Late homework. Completed assignments should be turned in at the beginning of class on the due date. Late assignments will receive only 70% of the normal credit.

• Posted solutions. Problem set solutions will not be posted. It is your responsibility to make sure you find out how to solve the problems by asking about them in class, or during office hours.

• Test and homework grading. If you believe an error has been made in grading on a problem set, bring it to me. If you believe that you should have gotten more points than you got for any reason other than a simple addition error, write a statement making your case and take it to me for decision.

• Missed tests. If you miss a test without either a certified medical excuse or prior instructor approval, you will take a makeup test at a designated time during the last week (dead week) of the semester. The makeup exam will be fair but comprehensive (covering all the course material) and challenging.
missed with certified medical excuses or prior instructor approval will be dealt with individually. Only one missed test can be made up.

• **Cheating in tests.** Any student caught cheating in a test will automatically get 0 for that test, and be reported to the university.

• **Attendance.** You are expected to attend the classes. 0.2% will be deducted if you are not present in the class to answer a quiz;

• **Calculation of course grade.**

  | Reading assignments | 5% |
  | Test 1              | 30% |
  | Test 2              | 30% |
  | Final (Comprehensive)| 35% |

<table>
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<th>Weighted average</th>
<th>&gt;98</th>
<th>97.9-94</th>
<th>93.9-90</th>
<th>89.9-86</th>
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<th>81.9-78</th>
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<th>67.9-63</th>
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<tr>
<td>Letter grade</td>
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<td>B+</td>
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<td>B-</td>
<td>C+</td>
<td>C</td>
<td>C-</td>
<td>D</td>
<td>F</td>
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No grade markup no matter how close.
Targeted grade distribution: A: 15-25%, B: 30-40%

**Teaching Style and Quiz:** Active student participation

How: A dice will be rolled to determine who participate. 0.2% will be deducted if you are not present in the class to answer a quiz; 0.2% will be given if you give the right answer; 0.2% will be given to a volunteer who gives the right answer. No credit will be given or deducted if you give a wrong answer.

**Reading Assignment Quiz:** For the 5% on reading assignments. Each missed assignment will reduce it by 1%. Quiz will be used to check if you have finished the reading assignment. A student will be chosen randomly using a dice to answer the quiz.

**Supporting Fellow Students in Distress:**

As members of the NC State Wolfpack community, we each share a personal responsibility to express concern for one another and to ensure that this classroom and the campus as a whole remains a safe environment for learning. Occasionally, you may come across a fellow classmate whose personal behavior concerns or worries you. When this is the case, I would encourage you to report this behavior to the NC State Students of Concern website: [http://studentsofconcern.ncsu.edu/](http://studentsofconcern.ncsu.edu/). Although you can report anonymously, it is preferred that you share your contact information so they can follow-up with you personally.