

COLLEGE OF CHEMISTRY COURSE GUIDE (../INDEX.HTML)

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MSE 103 - PHASE TRANSFORMATIONS AND KINETICS (3 UNITS)

COURSE OVERVIEW

SUMMARY

MSE 103 is an in-depth course on phase transformations in the solid state. The course covers the fundamental thermodynamics that govern phase transformations and then moves on to kinetics. It discusses various theoretical models which are used to model the mechanisms of phase transformations in solids.

The lecture of this course is highly theory-driven, and homeworks are meant to be applications of the theory. Homework assignments involve real data and phase diagrams of engineering materials

PREREQUISITES

MSE 45, MSE 102

Thermodynamics recommended (Chem 120B or CBE 141 are fine); Coding ability highly recommended (E 7 or CS 61A are fine)

TOPICS COVERED

- Mechanisms and kinetics of phase transformations in the solid state
- Reading and interpreting phase diagrams
- Atom diffusion in solids

- Phase transformations
- Martensitic transformations
- Spinodal decomposition
- Use of phase transformations to control microstructure

WORKLOAD

COURSEWORK

- Weekly problem sets which often involve coding.
- Two midterms and a final exam.

TIME COMMITMENT

A significant amount of time should be devoted to this class. The class has three hours of lecture per week, as well as an optional evening discussion section. Attending discussion and/or office hours is very useful for this class, as the homeworks can be challenging.

Homeworks for this class are extremely time consuming (approximately 4 - 10 hours depending on coding experience) and require a solid understanding of lecture material. Homeworks are assigned weekly, and the class moves at a swift pace so it is important not to fall behind otherwise homeworks can take even longer.

CHOOSING THE COURSE

WHEN TO TAKE

This class is offered only in the spring and meant to be taken directly after MSE 102 (offered in the fall only).

WHAT NEXT?

There are a variety of upper-division MSE courses that can be taken after this class. For more information: MSE Department Courses (<https://www.mse.berkeley.edu/courses/mse-courses>)

ADDITIONAL COMMENTS AND TIPS

Mathematica and MATLAB are extremely useful and highly utilized for homeworks in this class. As previously mentioned, keeping up with lecture material and attending office hours is important. Keeping organized notes is also important because a potentially overwhelming number of equations and variables are introduced each lecture.

Written by: Sophia Weng

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COLLEGE OF CHEMISTRY PEER SERVICES

Made by Angela Lee, c/o 2019



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