UNIVERSITY OF CALIFORNIA
College of Engineering
Department of Materials Science & Engineering

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MSE103 – Phase Transformations and Kinetics

Spring Semester 2015

LOGISTICS

Course Website	bCourses (MAT SCI 103 –LEC 001)
Lecture	MWF 11:00-12:00 HMMB 348
Discussion	W 5:00-6:00 HMMB 348
Office Hours	M, W 1:00-2:30 HMMB 225
Textbook	David A. Porter, Kenneth E. Easterling and Mohamed Y. Sherif, *Phase Transformations in Metals and Alloys*, 3rd Edition, CRC Press (2009). J. J. Hoyt, *Phase Transformations*, McMaster Innovation Press, (2010) – not a required text.
GSI	Rodrigo Freitas, rodrigof@berkeley.edu, Office Hours: TH. 1:00-2:00
Reader	Han Ee Ong, hanee.vis.ong@berkeley.edu

ETHICS

"As a member of the UC Berkeley community, I act with honesty, integrity and respect for others" (http://www.asuc.org/honorcode/index.php)

Ethics	Please remember that this is your honor code. It is a simple pledge that will serve you well during your academic career, and provide a solid foundation for success in your career as a practicing professional, when you will be held to even higher standards.

GRADING

Course Grade

There are no individual thresholds assigned to the different components of your grade. All components are scored, weighted, pooled, then mapped onto a curve for a course grade determination at the **end** of the semester, according to the following guidelines.

Homework 20%

Homework assignments are submitted in class by the due date and time. Deadlines are firm, to allow for timely uploading of solutions as additional study guides. Homework problems will be based on material in the textbook and the lecture notes. When computing the final homework grade, the lowest score on the assignments will be dropped.

The topmost objective of your homework assignments is to **guide your self-learning**. Homework is **not** meant to be a "group learning" exercise, and certainly not an artistic alteration of answers from others to avoid a plagiarism charge.

Midterm Exams 40%

Two midterms will be given during the weeks listed on the table below. The exact dates will be determined by consensus of the class. The midterm exams will be held in class.

Midterms are not cumulative. The first exam will test material from the beginning of the semester and the second midterm will cover material from the end of the first test.

Final Exam 40%

A cumulative three hour final exam will be held on Tuesday May 12 from 7-10 pm.

COURSE CONTENT

Week	Dates	Topics	Notes
1	Jan. 21 & 23	Intro, Review of first law of Thermodynamics	
2	Jan. 26-30	2nd law of thermo, phase equilibria, phase diagrams	HW01

3	Feb. 2-6	Binary and ternary phase diagrams	HW02
4	Feb. 9-13	Mathematics of diffusion, Fick's laws,	HW03
5	Feb. 18 & 20	Steady state and transient solutions	HW04
6	Feb. 23-27	Mechanism of diffusion in crystals, the diffusion coefficient	HW05
7	Mar. 2-6	Surface, interface and grain boundary energies, the Wulff construction	**EXAM**
8	Mar. 9-13	Classical nucleation theory, the critical nucleus.	HW06
9	Mar. 16-20	Heterogeneous nucleation, the nucleation rate, effects of elastic strain	HW07
10	Mar. 23-27	---- Break ----	HW08
11	Mar. 30-Apr. 3	Stability of solutions, spinodal decomposition	HW09
12	Apr. 5-10	The Gibbs-Thomson effect, particle coarsening	HW10
13	Apr. 13-17	Grain growth, Order-disorder transformations	HW11
14	Apr. 20-24	Martensite transformations	**EXAM**
15	Apr. 27 – May 1	Mechanisms of martensite formation	
16	May 4-8	RRR	
17	May 11-15	Final Exam Tuesday May 12, 7-10pm	