

**COMMONWEALTH GRADUATE ENGINEERING PROGRAM
DISTANCE LEARNING COURSE PLANNING SHEET
UNIVERSITY OF VIRGINIA**

Course: MSE 6230 –Thermodynamics and Phase Equilibria in Materials Science
Semester: Fall 2009
Instructor: Giovanni Zangari
Phone No.: 434-243-5474
Office Address: University of Virginia; Dept. of Materials Science & Engineering;
Wilsdorf Hall 303D; 395 McCormick Road; Charlottesville, VA 22903

E-Mail Address: gz3e@virginia.edu

Textbook(s): (Student to purchase)

R. DeHoff, “Thermodynamics in Materials Science,” 2nd Ed., CRC Taylor and Francis,
ISBN 0-8493-4065-9

Other texts, articles and notes will be distributed to the students as needed

Reference(s): Limit 4

If the student needs a refresher in general thermodynamics, the following booklet is strongly recommended:

E. Fermi “Thermodynamics” Dover ISBN 0-486-60361

Computer Needs:

Computer Capability:

Software required:

Provided?

Other: Access to Internet; a UVA email account in order to access Collab

See attached syllabus.

MSE 623

Thermodynamics and Phase Equilibria in Materials Science

Instructor: Giovanni Zangari
E-mail: gz3e@virginia.edu
Class times and location: T R 11 – 12:15, WDF 101
Office: Wilsdorf Hall 320
Phone: (434) 243-5474
Office Hours: MW 3 – 5 or by appointment

OBJECTIVES:

In this class, the student will acquire a working and quantitative knowledge of the machinery of thermodynamics as it applies to materials transformations and material processing. In particular, the students will learn how to use thermodynamic relationships and thermochemical databases to determine materials properties and generate, among others, stability diagrams and phase diagrams.

This course is part of a series of four core courses in the Materials Science graduate curriculum. Students enrolled in the MSE graduate program should devote particular attention to integrate the knowledge acquired in this course with that acquired in other core courses.

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Other texts, articles and notes will be distributed to the students as needed

TOOLKIT:

A web site for this course exists on the UVA Instructional Toolkit web site (<http://toolkit.virginia.edu/mse623-1>). Information on this course as well as supplementary material, assignments etc. will be available on this website.

SYLLABUS: (essentially DeHoff Chs. 1 – 11)

- 1. Introduction to the course**
The structure and laws of thermodynamics
- 2. Thermodynamic variables and relations**
Computations in unary, homogenous, closed and non-reacting systems
Application to the ideal gas
- 3. Equilibrium in thermodynamic systems**
Application to unary, biphasic systems
- 4. Unary heterogeneous systems**
- 5. Multicomponent homogeneous systems: solutions**

6. **Multicomponent heterogeneous systems**
7. **Phase diagrams**
8. **Multicomponent multiphase reacting systems**

GRADING CRITERIA:

- | | |
|--------------------------|----------|
| a) Two quizzes | 20% each |
| b) Homework and Projects | 20% |
| c) Comprehensive Final | 40% |

Homework will be assigned approximately weekly; only part of it will be graded. Interaction between peers in solving the homework encourages discussion and is generally regarded as beneficial. However, each student should solve and write down the problem solution individually.

All students should be aware of the Honor System at UVA, as summarized for example in:

http://records.ureg.virginia.edu/content.php?catoid=17&page=08c_honor_system.html