



THE UNIVERSITY OF
NEW SOUTH WALES

SCHOOL OF MATERIALS SCIENCE AND ENGINEERING

MATS1112

PHASE EQUILIBRIA

[SESSION 2, 2009]

Staff

Name Prof. C.C. Sorrell

Staff Location

Building School of Materials Science and Engineering
Grid Location E8
Room 105

Contact Information

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Consultation

Type By appointment

Course Contributors

Coordinator C.C. Sorrell (sole lecturer)
Examiner M. Ferry

Schedule

Day Fridays
Time 11 AM to 1 PM

Class Location

Building Central Lecture Block
Grid Location E19
Room 5

Course Aims

To provide students with an understanding of both fundamental and applied practices in unary, binary, and ternary phase equilibria of metals and ceramics:

Gibbs Phase Rule	Ternary Systems (X-T)
Unary Systems (P-T)	Liquidus Surface
Binary Systems (X-T)	Subsolidus Equilibria
Liquidus Surface	Lever Rule Calculations
Subsolidus Equilibria	Isothermal Sections
Lever Rule Calculations	Isoplethal Analyses
Phase Diagram-Microstructure Relationships	Crystallisation Paths
Non-Equilibrium Conditions	Non-Equilibrium Conditions

Course Intentions and Outcomes

To provide students with the means of interpreting and using phase diagrams for practical applications, particularly in terms of processing and performance.

At the end of the course, students should be able to interpret phase diagrams and use the embodied information to predict the conditions likely to be required for processing and to explain the reasons for observed performance.

Teaching Strategy

The course's approach to teaching is based on the provision of information and documentation that transmits the relevant concepts. Information transmission is largely by lecture.

A substantial amount of supporting information is available on the *Vista* platform.

Continual Course Improvement

Students will be requested to provide evaluative feedback through the UNSW Course and Teaching Evaluation and Improvement (CATEI) process.

A feedback facility will be provided on the *Vista* platform. Feedback from prior assessments will be discussed in Week 1.

Students are encouraged to raise any matters of concern. This may be directly through the lecturer, at the annual student-staff feedback forum, or both.

Students' comments on teaching methods and materials used during the session are welcome and will be appreciated.

Timetable

Regular weekly attendance

Attendance Requirements

Students are required to attend a minimum of 80% of the formal lectures. Therefore, students may not miss more than 2 classes. Students who miss more than 2 classes without appropriate justification will risk failure.

Tardiness >30 minutes will be counted as absence.

Roll will be taken each week.

Resources

All required materials will be provided.

Professionalism

All work done by students must originate from their own efforts.

The basic UNSW policy on plagiarism is given on the following page.

Assessment

Midterm Examination	Week 7	Open-Book/Open-Note	50%
Final Examination	End of Session	Open-Book/Open-Note	50%

The midterm and final examinations will cover binary and ternary systems, respectively; an understanding of binary systems will be required for both.

Units of Credit

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Evaluation

This class will be subjected to student evaluation during Week 12.

What is Plagiarism?

Plagiarism is the presentation of the thoughts or work of another as one's own. Examples include:

- Direct duplication of the thoughts or work of another, including copying material, ideas, or concepts from a book, article, report, or other written document (whether published or unpublished); composition, artwork, design, or drawing; circuitry; computer program or software; web site, internet, or other electronic resource; or another person's assignment without appropriate acknowledgement.
- Paraphrasing another person's work with very minor changes, keeping the meaning, form, and/or progression of ideas of the original.
- Piecing together sections of the work of others into a new whole.
- Presenting an assessment item as independent work when it has been produced in whole or in part in collusion with other people, for example, another student or a tutor.
- Claiming credit for a proportion of work contributed to a group assessment item that is greater than that actually contributed.

For the purposes of this policy, submitting an assessment item that already has been submitted for academic credit elsewhere may be considered plagiarism.

Knowingly permitting your work to be copied by another student also may be considered to be plagiarism.

Health and Safety

It is not foreseen that any issues of health and safety will arise.

References

There are many books on phase equilibria in the Physical Sciences Library. While none of these is a required text as all required printed material will be provided in class, some suitable introductory texts include:

A.M. Alper, Editor, *Phase Diagrams: Materials Science and Technology, Volume I* (1970)

C.J. Bergeron and S.H. Risbud, *Introduction to Phase Equilibria in Ceramics* (1984)

E.G. Ehlers, *The Interpretation of Geological Phase Diagrams* (1972)

R.A. Higgins, *Engineering Metallurgy: Part I: Applied Physical Metallurgy, 6th Edition* (1993)

E.M. Levin *et al.*, Editors, *Phase Diagrams for Ceramists* (1964 *et seq.*)

J.S. Marsh, *Principles of Phase Diagrams* (1935)

F.N. Rhines, *Phase Diagrams in Metallurgy: Their Development and Application* (1956)

D.R.F. West, *Ternary Equilibrium Diagrams* (1982)