



Sichuan University-Pittsburgh Institute

Course Syllabus

MSE1059-Phase Equilibria in Multicomponent Materials

Spring 2019

Instructor Information

Instructor: Dr. Yousef Faraj, Associate Professor
Office Location: 123, Zone 4 SCUPI
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Office Hours: Wed. 13:00–15:00
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Course Identification

Course Code: MSE1059
SCU Course ID: 312060030
Course Name: Phase Equilibrium in Multicomponent Materials
Course Credit: 3 Credits, Compulsory (Required)
Course Location: 203, Zone 4 SCUPI
Class Times: Mon. 13:50–16:25

Course Description/Overview & Topics

Thermodynamics of solution with applications to materials systems; heterogeneous phase Equilibria; relations between free energy and phase diagrams Electrochemistry; rate processes, thermodynamics of surfaces and interfaces.

Course Topics:

1. Review of Basic Thermodynamics
2. Thermodynamics of Solutions
3. Phase Equilibria and Free Energy Diagrams
4. Chemical Reactions Involving Gases
5. Chemical Reactions Involving Solids and Gases (Thermochemical Diagrams)
6. Reactions Involving Solutions
7. Electrochemistry
8. Thermodynamics of Surfaces

Course Objectives & Learning Outcomes

The course is designed to provide juniors in MSE and Engineering Science fundamental understanding of Classical Thermodynamics and its application to materials problems.

Course learning outcomes:

1. Thermodynamics of Solutions
2. Binary Phase Diagrams
3. Free Energy Diagrams
4. Chemical Reaction Equilibria
5. Thermodynamics of Electrochemical Cells
6. Thermodynamics of Surfaces and Interfaces

Course Resources

Course Website(s):

- Blackboard (BB) <<https://learn.scupi.cn/>>

Required Course Textbook:

- Introduction to the Thermodynamics of Materials, by D. R. Gaskell, © 2018 Taylor & Francis 6th ed., ISBN-13: 978-1-4987-5700-3

Grading Scheme

Grading System:

Letter Grade	Percentage	Rating
A	92% and above	Excellent
AB	85% – 91%	Very Good
B	80% – 84%	Good
BC	75% – 79%	Above Average
C	70% – 74%	Average
CD	60% – 69%	Below Average
D	50% – 59%	Inferior
F	49% and below	Failure
I	Incomplete; given only when a student is unable to complete a segment of the course because of circumstances beyond the student's control. A grade of incomplete may be given only when approved in writing by the department chair or school dean.	
X	Conditional, with no grade points per credit; given only when the student is at fault in failing to complete a minor segment of a course, but in the judgment of the instructor does not need to repeat the course. It must be made up within the next semester in residence or the grade becomes a failure (F).	

Course Grading

Grades will be based on the following:

Quizzes & Homework (6 to 8 as time permits)	30%
Midterm Exam (Late April or Early May)	30%
Final Exam (Late June)	40%
Total	100%

Course Policies

1. Attending all the lectures is strictly required. Failure to attend any lecture without a reasonable excuse and/or producing an appropriate evidence will be subjected to some percentage mark cut (final mark).
2. Exams will be closed-books and closed-notes. Notes and key equations will be provided. If necessary, plots and tables will either be provided prior to the exam via BB or during the exam.
3. Quizzes will mainly be multiple-choice type, and administered during class hours.
4. Homework mainly consists of Multiple Choice Questions, designed to assess the students' ability to recall basic and foundational pieces of knowledge related to a particular Sections of the course and to encourage the students to review the key concepts they have had during the lecture. Some questions within the MCQs are intentionally designed to assess the students' ability to think analytically about the subject.
5. The due dates of homework will be strictly enforced. A delay in submitting any homework will be subjected to 5% mark cut per day for the duration of three days, after which the homework will not be accepted and 0% mark will be assigned for that particular homework.
6. Exams will require calculations, analyses and conclusions. These will be administered off-class hours.
7. In normal circumstances, make-up exams and quizzes will not be allowed. However, they may be allowed in some rare cases such as health issues, family emergencies, approved university-related functions, course conflicts. A letter of request (with a supporting evidence) has to be submitted to the instructor and/or the department for approval.
8. All students are required to actively engage in classroom discussions.

Plagiarism Rules

Mobile phones, iPods, PDAs, or any other electronic device is not to be used in the classroom and examination room. Please make sure to bring a calculator with you to class and during the exams and quizzes. Calculators on other devices are strictly prohibited. Information exchanges on these devices during class are also prohibited and may violate the Academic Integrity Code of SCUPI (you are advised to familiarise yourself with this code on SCUPI website).

University Policies

Academic regulations and procedures are governed by University policy. Academic dishonesty cases will be handled in accordance with the University's policies. Please make sure you are aware of these policies.

NOTE:

The instructor reserves the right to make changes to this syllabus, anytime during the semester. All the students will be informed of any possible change through Blackboard.