

CHEMICAL ENGINEERING 311 - FALL 2002

THERMODYNAMICS OF MIXTURES

INSTRUCTORS: JUAN J. DE PABLO

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Course Outline

1. Review of classical thermodynamics for pure systems
 - the postulates of thermodynamics
 - definitions, thermodynamic potentials
 - thermodynamic manipulations
 - thermodynamic stability
2. Introduction to Molecular Interactions
 - electrostatic and dipolar interactions
 - intermolecular potential energy functions
 - macroscopic manifestations of specific interactions
3. The properties of ideal mixtures
 - ideal-gas mixtures
 - ideal or Lewis mixtures
4. The properties of non-ideal mixtures
 - chemical potential and fugacity
 - partial molar properties
 - calculation of fugacity and fugacity coefficients
5. Phase Equilibria
 - vapor-liquid equilibria
 - Henry's law
 - equations of state
6. Thermodynamics of solutions
 - property changes of mixing
 - excess thermodynamic properties; activity coefficients
 - liquid-liquid equilibria
7. Chemical reactions
 - chemical reactions
 - equilibrium constants
 - coupled chemical reactions and phase equilibria
8. Thermodynamics of polymer solutions
9. Thermodynamics of surfaces

Course evaluation and related issues

1 Homework

Homework and class participation account for 5% of the final grade. There will be one homework assignment per week, due every Tuesday at 9:30 am. Solutions to the homework will be posted weekly on the third-floor cabinet. Students who fail to turn in more than two homework sets will receive a failing grade for the course. Students are allowed to turn in *one* homework set late, provided they request prior approval from the instructor or the teaching assistants.

2 Exams and quizzes

There will be 3 short quizzes, 2 exams, and one final exam. Each quiz accounts for 5% of the final grade, and each exam accounts for 25% of the final grade. The final exam constitutes 30% of the final grade. Unless otherwise indicated, the dates for quizzes and exams will be as follows:

- quiz 1: February 4
- quiz 2: March 13
- quiz 3: April 29

- exam 1: February 25
- exam 2: April 3
- final exam: May 13

3 Office hours

Office hours will be:

1. Instructor: Thursdays, 3 to 5 pm, 3018 Engineering

4 Additional information

1. Prof. J.J. de Pablo, depablo@engr.wisc.edu, 262-7727
2. Mr. Tommy Knotts, taknotts@students.wisc.edu, 262-2448
3. Ms. Xin Xiang Wang, xxwang@students.wisc.edu