155: 309 Chemical Engineering Thermodynamics II Fall 2014

Web page: https://sakai.rutgers.edu
Lectures: Mon, Wed 8:40–10:00 am, BME 102
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Course Description:
Properties of solutions, phase equilibria, thermodynamics of self-assembly and chemical reaction equilibria.

Course Objectives:
The students will understand phase equilibria as applied to liquid and gases, properties of liquid and gaseous mixtures, thermodynamics of self-assembly (specifically for polymers) and chemical reaction equilibria. An understanding of these topics is required for later courses and essential for the development of a career in chemical engineering.

Textbook:
Koretsky, M.D. 2013. **Engineering and Chemical Thermodynamics**. Second edition. John Wiley & Sons, NY.

Class Participation:
Class participation and attendance is essential. Students will fill in a class roster to record their attendance. Students with more than two absences per semester will lose up to 5 points.

Assessment:

Attendance: 5%, Homework: 20%, Quizzes: 25%, Midterm exam (1): 25%, Final exam: 25%

Weekly Quizzes:
Quizzes will take place every week on Wednesday (last 30 mins of the class.) The quizzes will be based upon the homework problem sets and problems solved in the lectures.

Weekly Homework:
Homework sets are handed out every week (Monday) and are due a week later (Monday the week after). The graded homework's will be returned on the Wednesday after the week the homework was due. **Late homeworks will not be accepted.**

Course Context:

Week	Date	Topic	Reading Assignment
1	Sep 3	Assessment Test, Phase Equilibria I: Single Component	Ch. 6.1
2	Sep 8	Phase Equilibria I: Pure Species Equilibrium	Ch. 6.2
	Sep 10	Phase Equilibria I: Pure Species Equilibrium, Quiz	Ch. 6.2
3	Sep 15	Phase Equilibria I: Thermodynamics of Mixtures	Ch. 6.3
	Sep 17	Phase Equilibria I: Thermodynamics of Mixtures, Quiz	Ch. 6.3
4	Sep 22	Phase Equilibria I: Thermodynamics of Mixtures, Multicomponent Phase Equilibria	Ch. 6.3-6.4
	Sep 24	Phase Equilibria I: Multicomponent Phase Equilibria, Quiz	Ch. 6.4
5	Sep 29	Phase Equilibria II: Fugacity	Ch. 7.1-7.3
	Oct 1	Phase Equilibria II: Fugacity in Vapor Phase, Quiz	Ch. 7.3
6	Oct 6	Phase Equilibria II: Fugacity in Vapor Phase	Ch. 7.3
	Oct 8	Phase Equilibria II: Fugacity in Liquid Phase, Quiz	Ch. 7.4
7	Oct 13	Phase Equilibria II: Fugacity in Liquid and Solid Phases	Ch. 7.4 – 7.5
	Oct 15	Phase Equilibria III: Vapor-Liquid Equilibrium, Quiz	Ch. 8.1
8	Oct 20	Phase Equilibria III: Vapor-Liquid Equilibrium	Ch. 8.1
	Oct 22	**Midterm**	**Chs. 6 - 7**
9	Oct 27	Phase Equilibria III: Liquid-Liquid Equilibrium	Ch. 8.2
	Oct 29	Phase Equilibria III: Vapor-Liquid-Liquid Equilibrium, quiz	Ch. 8.3
10	Nov 3	Phase Equilibria III: Solid-Liquid and Solid-Solid Equilibrium	Ch. 8.4
	Nov 5		
11	Nov 10	Phase Equilibria III: Colligative Properties	Ch. 8.5
	Nov 12	Chemical Reaction Equilibria: Introduction and Gibbs Energy, Quiz	Ch. 9.1 – 9.2
12	Nov 17	Chemical Reaction Equilibria: Equilibrium for a single reaction, Calculation of K from Thermochemical Data, Chemical Reaction Equilibria: Multiple Reactions	Ch. 9.3 – 9.4
	Nov 19	Research/ Problem solving, Quiz	
13	Nov 24	Chemical Reaction Equilibria: Equilibrium Constant and Concentration of Reacting Species	Ch. 9.5
	Nov 26	NO CLASS – THANKSGIVING RECESS	
14	Dec 1	Research Discussion, Problem solving	

	Dec 3	Research, Problem solving, quiz	
15	Dec 8	Chemical Reaction Equilibria: Multiple Reactions	Ch. 9.7
	Dec 10	**FINAL EXAM**	**Chs. 8 - 9**

Academic Integrity

Students are expected to familiarize themselves with and adhere to the University policy on academic integrity at: http://academicintegrity.rutgers.edu/integrity.shtml. It is understood that a student's name on any individual homework assignment, quiz, or exam indicates that he/she neither gave nor received unauthorized aid. On individual homework assignments, authorized aid includes discussing: 1) interpretation of the problem statement, 2) concepts involved in the problem, 3) approaches for solving the problem. Anything beyond this constitutes unauthorized aid and violates the academic integrity policy. A student's name on a group assignment indicates that he/she contributed to the assignment. Disciplinary actions for academic misconduct will be in accord with the University policy on academic integrity. At a minimum, a first offense will result in a zero for the assignment, and may be more severe. The penalty for repeat offenses will be significantly more severe. A third offense will result in a failing grade for the course.

ABET Outcomes and Assessment:

Program outcomes achieved in this course

(a) an ability to apply knowledge of mathematics, science and engineering;
(e) an ability to identify, formulate, and solve engineering problems;
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

The achievement of outcomes (a), (e) and (k) will be assessed in this course as follows:

Outcome (a): an ability to apply knowledge of mathematics, science and engineering.
Homeworks and exams problems will test the ability to apply knowledge of mathematics, science and engineering in problem solving

Outcome (e): an ability to identify, formulate, and solve engineering problems
Homework and exams will require the identification of key variables from available information and the formulation of appropriate equations to solve for system unknowns.

Outcome (k): an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
Students will use Matlab to aid in problem solving. Some problems will require the use of electronic or library reference sources to find physical properties. Course materials will be distributed electronically using a course interaction software portal.