UTAH STATE UNIVERSITY

CHEMISTRY 3060

FALL SEMESTER 2007

Instructor: Alexander I. Boldyrev

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Class times:	W333	MWF	9:30-10:20
Office hours:	ML369	MW	2:00-4:00

I will be happy to make appointments with anyone who has unavoidable conflicts at these times. The best way to contact me outside office hours is by email.

September 17 – last day to receive tuition refund; September 17 – last day to add class; September 17 - last day to drop w/o notation on transcript; September 18 – October 25 – late adds require a petition and documentation, October 26 – November 9 - drops require a late drop form (WF on transcript); November 9 – last day to submit petition for late drop form.

The final exam will be given at 9:30-11:20 am in BUS-313, on Wednesday, December 12.

There are no classes on September 3, October 19, and November 21-23.

CHEMISTRY 3060 PHYSICAL CHEMISTRY

Syllabus

Fall Semester 2007

In accordance with the Americans with Disabilities Act, reasonable accommodation will be provided for all persons with disabilities in order to ensure equal participation in this course.

Text: Physical Chemistry (5-th edition) by Ira N. Levine.

I will make reading assignments from the text. You are responsible for studying all the material in these assignments even if it isn't covered in lectures.

Important information regarding Math Prerequisites:

Physical chemistry is a course in chemistry not mathematics; however, weak math skills can cause considerable difficulties for students. The mathematical tools needed for physical chemistry are not very advanced, but it is vitally important that the student is able to use them well. In particular, multivariable calculus is used extensively in the course, so **if you have not completed Math 2210 (old Math 320) or an equivalent course, you MAY NOT register for Chem 3060 WITHOUT PERMISSION OF THE INSTRUCTOR**. In the interest of fairness, grading cannot take into account math weaknesses.

Learning Objectives for Physical Chemistry

Divisional level learning objectives in physical chemistry are as follows. After completing the course students will be able to:

1. Apply the basic concepts of calculus to concepts in chemistry.
2. Discuss the Three Laws of Thermodynamics and their development.
3. Use the Maxwell equations and other thermodynamic relations to compute thermodynamic quantities from thermodynamic data tables.
4. Be able to derive relationships between thermodynamic quantities.
5. Interpret phase diagrams and discuss phase equilibria in terms of chemical potentials.
6. Explain the origin of K_{eq} and its relation to fugacity and activity and apply these concepts to ideal and real solutions of electrolytes and non-electrolytes and to colligative properties.
7. Apply the principles of electrochemistry to conductance, voltaic, and electrolytic systems.
8. Provide a physical basis for Debye-Huckel theory.
9. List the methods for arriving at a plausible mechanism and/or rate law based on kinetic information.
10. Manipulate the gas laws to describe real and ideal gas behavior.
11. Apply the steady-state hypothesis to obtain rate equations.
12. Explain the basic principles of photochemical and radiation-chemical reactions.

Assessment

Assessment of student learning will be performed via gain-score exams. A gain score test (GST) is a method of assessing how well a course transmits knowledge and understanding of critical concepts. Two tests will be administered at the start and end of the course. Grading is anonymous. You may not keep a copy of this test and correct answers will not be supplied except upon request after the GST at the end of the semester has been done. You should not include any identifying information on the scantron.

Course content: The following topics will be covered:

Thermodynamics
The First Law of Thermodynamics
The Second Law of Thermodynamics
Material Equilibrium
Standard Thermodynamic Functions of Reactions
Reaction Equilibrium in Ideal Gas Mixtures
One-Component Phase Equilibrium
Real Gases
Solutions
Nonideal Solutions
Reaction Equilibrium in Nonideal Systems
Multicomponent Phase Equilibrium
Surface Chemistry
Electrochemical Systems
Kinetic Theory of Gases
Transport Processes
Reaction Kinetics

Homeworks: Homework assignments will be given at every lecture. I encourage you to work out every assignment before the next lecture. Homework will not be graded, but on every lecture there will be a short quiz which may contain one modified problem from the previous homework.

Quizzes: There will be approximately 30 short quizzes during lecture time (about 5 minutes). Every quiz will yield 5 points maximum.

Exams: There will be two one hour exams given during the regular class period. These will cover only chemical thermodynamics, each will yield 100 points maximum. The final exam will be comprehensive, covering material from the entire course. It will yield 150 points maximum.

The first midterm exam will be given at the scheduled time on October 1.

The second midterm exam will be given at the scheduled time on November 12.

The final exam will be given at 9:20-11:20 am in BUS-313, on Wednesday, December 12 and WILL NOT be given early to accommodate travel arrangements, so plan accordingly.

All exams are closed book. A typical exam will consist of 100 points worth of short answer questions that ask you to define important terms or state important principles introduced since the last exam.
THERE WILL BE NO MAKE-UP EXAMS. Arrangements to compensate for a missing exam may be requested only with verifiable medical certification.

Grading: The course grading is based on approximately 500 total points.

I. Exams - 350 points total

II. Every quiz will yield 5 point (total approximately 150 points).

Final grades: Final grades are computed by setting the dividing line between **B-** and **C+** at either 80% of the possible total points or the class average for total points, whichever is lower. The other grades are than assigned in proportion.

Obtaining help: I discourage the use of solution manuals or workbooks because they will fool you into thinking you know how to work the problems when you don't. The same applies to the answers given in the back of the text. **Too much reliance** on these makes it easy to fall into the **dangerous habit** of mindlessly plugging numbers into formulas until you obtain the given answer. This **does not constitute understanding** and will lead to **disaster** on exams where you will not know the answer you are supposed to obtain!

Collaborating on the problem sets is not forbidden and a certain amount can be helpful, **but you must learn to work the problems on your own, or you won't be able to pass the exams**.

I am more than willing to assist you with the problems; this is largely what my office hours are for. I only ask that you observe a few ground rules:

1. I won't give out help over the telephone or the internet.

2. When you come to see me, please be prepared with specific questions. ("I don't understand" is not a question.) There are only two questions (and all variations thereof) that I won't answer, "How do you work this?" and "Is this right?". Otherwise, any question is permissible, including questions having nothing to do with the problem sets. For example, you may wish to ask about unclear points in the lectures or reading assignments.

3. If you have a question about a problem, bring a calculator and any partial work you have completed on the problem as well.