CHEM 3410: Physical Chemistry I - Fall 2007

INSTRUCTOR — Professor Marc Richard
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When contacting me via email, please place "PCHEM" at the beginning of the subject line.

OFFICE HOURS — Mondays 3–4:30, Thursdays 2–4 or by appointment
Call or email and we can always find a time to meet

LECTURE — MWF 8:30–9:45 PM

TEXTBOOK — *Physical Chemistry*, Engel and Reid, 1st edition

WEBSITE — Course materials are available on **WebCT**. Contact me immediately if you are having trouble accessing the class site. All materials distributed in class as well as homework solutions, lecture summaries, and other documents will be posted on the class site. Please check the site frequently for new materials and announcements.

COURSE GOALS

1. Develop an understanding of the basic laws of thermodynamics and their application to chemical equilibrium.
2. Apply thermodynamics to simple, real systems, enabling us to make predictions about the behavior of more complex systems.
3. Gain insight into the kinetics of chemical processes and the relationship between thermodynamics and kinetics.
4. Apply these skills to develop problem-solving expertise enabling the solutions of both quantitative and qualitative problems.

PREREQUISITES — At least a total of six semesters of chemistry, physics and calculus courses (*One year of general chemistry plus one year of college physics and a semester of calculus are needed as a minimum for this course. A year of organic chemistry is also recommended and additional calculus would be helpful.*)

Procedures and Policies

LECTURE — Regular attendance is important and expected. **Please arrive on time.** Late arrivals are disturbing for the entire class. The lecture will cover new material and sample/group problem solving. Since we will be doing problem solving during class, please bring your calculator with you. Mobile phones, pagers, and other sound-producing devices must be turned off or silenced during class meetings.

PROBLEM SETS — Weekly problem sets will be handed out in class and posted on the course website on most Wednesdays. They will be due in class the following Wednesday. Exceptions, including weeks when exams are scheduled, will be announced in class. Solutions to the assigned problems will be posted on the course website soon after they are due.

Completing problems are an important learning and study tool. I will be focusing more on how you arrive at your answer rather than on the final answer itself. Therefore, it is essential that you **show your work**.

Please come to office hours with questions on the assigned problem. Feel free to work in groups, however everyone must turn in their own work and remember, you will be taking exams independently. Be sure to acknowledge assistance from any outside source including reference materials or other students.

Late Policy

Solutions for problem sets will be posted on due dates, therefore no late problem sets will be accepted. In consideration of the inevitable conflicts and/or personal situations, the lowest problem set grade will be dropped. Use this drop wisely, as you may need it if you are sick, hospitalized, out of town for a funeral, or away for an extracurricular activity.

Exams

There will be two in-class exams tentatively schedule for **Wednesday, October 10 and Friday, November 16**. A comprehensive final exam will be given as determined by the extended class schedule on **Monday, December 10, 8:30–11am**.

Exams will cover lecture material and homework. Exams will emphasize concepts and understanding, so no need to memorize lots of equations. You will be allowed to prepare a single page (8.5×11, two sides) of notes for each exam. Calculator use will be permitted for exams.

I will grant permission to make up an exam if the absence is due to any of the following: (1) serious illness; (2) an order from the US Military; (3) officially representing the College; (4) death in the immediate family. All such instances will require documentation before a make-up exam will be given.

Academic Honesty

Collaboration is important part of learning, especially in the sciences. Working in groups to discuss homework and class materials is encouraged. When turning in written work, assistance from other students or outside sources must be acknowledged. Please review the college's academic honesty policy available on the Academic Affairs website.

The use of wireless communication devices during any exam is strictly forbidden.

Other Issues

Students with disabilities who may need disability related classroom accommodations (or other considerations) for this course are encouraged to speak with the Learning Access Program, Located in West Quad Building, Suite 110 or by calling 652-4988.

Grading

Your written work for this course will receive numerical grades. Each component of the course will be weighted as follows:

Problem Sets	15%
Two Exams	50%
Final Exam	30%
Class Participation	5%

There are no set ranges for particular letter grades. The grading scale will depend in part on my assessment of the difficulty of exams and the final. The grading scale for students completing all course requirements will not be raised above the 90–100% = A-range, 80–90% = B-range, 70–80% = C-range, 60–70% = D-range scale. This means if you receive an overall percentage of 90% and complete all course requirements, you will get a grade in the A-range. If you have an overall percentage of 89% and you have completed all course requirements you will be guaranteed *at least a grade in the B-range.*

Resources

Office hours and discussion sessions are your first stop if you have questions or problems you would like to discuss. Use of the online discussion on WebCT is also encouraged.

Tentative Course Outline

Here's a brief and tentative outline of the topics we will cover this term along with the corresponding chapters in the text. There may be supplemental readings distributed throughout the term. The sequence of topics is tentative and I'll give you updated schedules along the way.

1. Basic Laws of Thermodynamics — Chapters 1–5
   (a) Heat and Work
   (b) Internal Energy and the First Law
   (c) Internal Energy vs. Enthalpy
   (d) Entropy and the Second Law
   (e) The Third Law
2. Chemical Equilibrium — Chapters 6–9
   (a) Gibbs Free Energy
   (b) Chemical Potential
   (c) Application to Ideal and Real Gases
   (d) Phase Equilibria and Unary Phase Diagrams
   (e) Ideal and Real Solutions: Activity
   (f) Binary Phase Diagrams
   (g) Solid-state Phase Diagrams
   (h) Phase Transformations
3. Kinetics — Chapters 36–37
   (a) Reaction Rates
   (b) Rate Laws
   (c) Reaction Mechanisms
   (d) Temperature Dependance of Reaction Rates
   (e) Reaction Mechanisms and Rate Laws: How are they related