CHEM 3420: Physical Chemistry II - Spring 2009

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When contacting me via email, please place "PCHEM" at the beginning of the subject line.

Office Hours Thursdays 2–4 or by appointment
Call or email and we can always find a time to meet

Lecture MWF 8:30–9:45 AM

Labs Tuesdays, 8:30-11:10 AM, F-010

Textbook *Physical Chemistry*, Levine, 6^{th} edition

Experiments in Physical Chemistry, Garland, Nibler, an Shoemaker, 8^{th} edition (*optional, available on reserve in the library*)

Lab Manual *Physical Chemistry Lab Manual*, Available in the bookstore for purchase.

Website Course materials are available on the course blog at `http://titania.stockton.edu/pchem`

The blog will be the place to find announcements, lecture summaries & slides, homework, exams, and solutions. In addition, a series of podcasts will be available aimed at helping you review the important mathematics skills necessary for success in physical chemistry. Please check the site frequently for new materials and announcements.

Course Goals

1. Develop an understanding of quantum mechanics and its application to atomic and molecular structure
2. Apply quantum mechanics to spectroscopic techniques used to probe the structure of materials
3. Use these skills to develop problem-solving expertise enabling the solutions of both quantitative and qualitative problems
4. Apply physical chemistry concepts to experimental work in the laboratory

Prerequisites Physical Chemistry I (3410) plus 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.

Laboratory Attendance is mandatory. You must complete all laboratory assignments in order to pass the course. No unexcused absences are permitted. If it is necessary to be absent from a regular lab period for important reasons, you must contact me in advance. Your ride leaving early on Tuesday during the week before Spring Break does not qualify as an important reason. You must wear goggles and shoes with closed toes (no sandals) at all times in the lab. No exceptions.

Homework

Homework will be handed out in class and posted on the course blog on a regular basis. They will be due in class on the date indicated, usually a 2–3 classes after they are assigned. 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 problems. 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.

Lab Reports

Read the general lab guidelines and advice on lab reports, data analysis, preparation of graphs, note keeping, etc. in the lab manual before your first lab and refresh your memory after a few weeks. There are examples for all of the above in the lab manual as well as help files online. Full lab reports are due in lab **two weeks** after completing an experiment. Summary (short) lab reports are due in lab **one week** after completing a lab. The type of report required is explained for each experiment in the lab manual.

Late Policy

Solutions for homeworks will be posted on due dates, therefore no late assignments will be accepted. In consideration of the inevitable conflicts and/or personal situations, the lowest assignment 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.

I realize that your semester will create some busy periods so you are given 10 days of extensions for lab reports only, which must be used in one-day units. These extension days include weekends. To use an extension, please write "# days extension used" on the title page. . However, I do not want to encourage procrastination, so beyond that I will have to reduce your lab report grade points by 10% for each day that the report is late.

Extension days can only be used until Wednesday, April 29. Beyond that date, all reports will be considered late and penalized accordingly.

Exams

There will be at most a total of three exams tentatively scheduled for **Friday, February 27, Friday, March 27, and Wednesday April 29**. Our final exam class session as determined by the extended class schedule is on **Monday, May 4, 8:30–11am**.

Exams will cover lecture material and homework. Exams will emphasize concepts and understanding, so no need to memorize lots of equations. The format of the exams will be discussed in class.

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. Collaboration on any exam is not allowed. **Handing in someone elses work as your own is cheating and will result in significant penalties.** Please review the college's academic honesty policy available on the Academic Affairs website.

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:

Laboratory	25%
Homework	15%
Exams	30%
Project	25%
Participation (Class/Lab)	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.*

Tentative Course Outline

Here's a brief and tentative outline of the topics we will cover this term. 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. The Foundation
   (a) Properties of waves
   (b) From the classical to quantum world
   (c) Wave equations
2. Atoms and Atomic Structure
   (a) Hydrogen: atomic orbitals
   (b) Helium: adding another electron is trouble
   (c) Beyond helium: approximations and trends
   (d) Periodicity & atomic spectroscopy: exciting atoms
3. Molecules
   (a) Transitions: translation, rotation, and vibration, oh my!
   (b) Chemical bonding: from atomic to molecular orbitals
   (c) Spectroscopy: using transitions to talk to molecules
4. The Solid State
   (a) From molecules to solids
   (b) Solid state structures
   (c) Diffraction: communicating with solids
   (d) Structure-property relationship in solids