

Chemistry 6411 – Advanced Physical Chemistry
Course Syllabus Fall 2009
(see also <http://jilawww.colorado.edu/weberlabs/CHEM6411.html>)

Instructor: J. Mathias Weber

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Office Hours: Mondays 13:00 – 14:00, Tuesdays 13:00 – 14:00;
these times may be changed if needed

Course type: Lecture

Prerequisites:

Formal: Two semesters of physical chemistry and graduate standing, or instructor consent.

Content and objectives:

The purpose of the course is to help you obtain a deeper understanding of some of the basic principles and foundations of physical chemistry. In this class, you will become familiar with some background in theoretical classical mechanics, electrodynamics, kinetics and statistical mechanics. You will see how common mathematical tools will be used in these contexts. The course will be useful for sharpening your physical intuition and for your other graduate classes.

Exams:

- Midterm exams: There will be two midterm exams. They will be 2-hr-exams, probably held during evenings; the dates and times will be discussed in class.
- Final: Probably a take home exam; date and time will be discussed in class

Homework assignments (problem sets):

Usually handed out Thursdays, to be turned in the following Thursdays before class. Homework should be done on your own. However, you can certainly discuss it with your classmates.

Grades:

- Homework assignments (problem sets) are very important in the framework of this course. Therefore, homework will count 50% towards the final grade, the two midterm exams will count 30% and the final exam will each count 20%.
- Students with homework average grades of A may drop one exam (in that case, homework will count 60% and the two remaining exams count 20% each).
- Everybody may drop one homework assignment without penalty.
- Regular class attendance is expected and might be taken into account if the grade is halfway between two levels.

Literature:

Since this class is very broad in scope, there is no fixed textbook. You should look around and find textbooks that you like and that suit your needs. This means that you have to do a little more legwork yourself, but you will end up using books that you like, instead of books that only I like. Here are some candidates (there are certainly many others!). I will give you a bibliography for some of the topics we touch in class.

- “Mechanics” by K. R. Symon
- “Classical Mechanics” by H. Goldstein, C. Poole and J. Safko
- “Mathematical Physics” by E. Butkov
- “Mathematical Methods for Scientists and Engineers” by D. A. McQuarrie
- “Applied Mathematics for Physical Chemistry” by J. R. Barrante
- “Classical Electrodynamics” by J. D. Jackson
- “Laser Spectroscopy” by W. Demtröder
- “Chemical Kinetics and Dynamics” by J. I. Steinfeld, J. S. Francisco and W. L. Hase
- “Statistical Mechanics” by K. Huang

A lot can also be learned from some undergraduate P-Chem textbooks, e.g.

- “Physical Chemistry” by P. Atkins and J. de Paula
- “Physical Chemistry” by D. A. McQuarrie and J. D. Simon

You don't necessarily have to buy any of these books just for this class. Those of you who are more mathematically/theoretically inclined will probably benefit from a book like Butkov's “Mathematical Physics”, while others may find Barrante or McQuarrie sufficient for their needs. Everyone of you probably should have a good undergraduate P-Chem text (my favorite is McQuarrie and Simon for the quantum mechanics part and Atkins for thermodynamics). It may be wise to plan ahead and ask those people you plan to take courses from in the spring (e.g. Spectroscopy, Statistical Mechanics, etc.).

Some University Policies:

1. Students with Disabilities:

If you qualify for accommodations because of a disability, please submit to me a letter from Disability Services in a timely manner so that your needs be addressed. Disability Services determines accommodations based on documented disabilities. Contact: 303-492-8671, Willard 322, and <http://www.Colorado.EDU/disabilityservices> .

If you have a temporary medical condition or injury, see guidelines at

<http://www.colorado.edu/disabilityservices/go.cgi?select=temporary.html>

Disability Services' letters for students with disabilities indicate legally mandated reasonable accommodations. The syllabus statements and answers to Frequently Asked Questions can be found at <http://www.colorado.edu/disabilityservices> .

2. Considerations for a Possible Serious Pandemic Outbreak

If there is a serious outbreak of H1N1 on campus, alterations in course content and/or structure may be necessary. Students who are ill with flu-like symptoms should NOT come to class or have close contact with other students (e.g., study groups). They should NOT return to class until 24 hours after fever has abated. Both abuse of a more lenient absence policy and attendance in class while contagious are incompatible with our code of individual responsibility (see point 6 on Honor Code).

3. Religious Observances:

Campus policy regarding religious observances requires that faculty make every effort to reasonably and fairly deal with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, please indicate any such conflicts to me **within the first week of class**. Religious observances on regular class dates do not constitute a problem, but please notify me as well about such occurrences. See full details at http://www.colorado.edu/policies/fac_relig.html .

4. Classroom Behavior:

Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender, gender variance, and nationalities. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. See policies at

<http://www.colorado.edu/policies/classbehavior.html> and at

http://www.colorado.edu/studentaffairs/judicialaffairs/code.html#student_code .

5. Discrimination and Harassment:

The University of Colorado at Boulder policy on Discrimination and Harassment, the University of Colorado policy on Sexual Harassment and the University of Colorado policy on Amorous Relationships apply to all students, staff and faculty. Any student, staff or faculty member who believes s/he has been the subject of sexual harassment or discrimination or harassment based upon race, color, national origin, sex, age, disability, creed, religion, sexual orientation, or veteran status should contact the Office of Discrimination and Harassment (ODH) at 303-492-2127 or the Office of Judicial Affairs at 303-492-5550. Information about the ODH, the above referenced policies and the campus resources available to assist individuals regarding discrimination or harassment can be obtained at <http://www.colorado.edu/odh> .

6. Honor Code:

All students of the University of Colorado at Boulder are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. All incidents of academic misconduct shall be reported to the Honor Code Council (honor@colorado.edu; 303-735-2273). Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion). Other information on the Honor Code can be found at <http://www.colorado.edu/policies/honor.html> and at <http://www.colorado.edu/academics/honorcode/> .