

CHE 339: Advanced Physical Chemistry

Block 5 2006-07

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Office hours: officially, MW 11-noon and M-F 2-3 pm; unofficially, just stop by anytime

Course goals

In this block we will study topics at the forefront of modern physical chemistry. We will go beyond the principles learned in Physical Chemistry I & II, applying these principles to advanced topics. We will study solids, surfaces, nanoscience, forces between chemical species, lasers and their applications, and other topics as negotiated among us. We will also read and discuss the primary literature in physical chemistry. This course should expose you to the current state of the field, including experimental methods. After this course, you should be well prepared for future study of physical chemistry.

Texts and other materials

Required: Physical Chemistry, 7e or 8e, by Atkins and de Paula; scientific calculator

Optional: Student Solutions Manual for Physical Chemistry, 7e or 8e, by Atkins, Trapp, Cady, and Giunta. There is a copy of this in my office for your use.

We will draw from Atkins and de Paula regularly, although not near as much as in Physical Chemistry I & II. In this course, there will often be supplemental readings from other books and reading the primary literature will be necessary as well. These materials will be discussed in more detail soon.

Meeting times, format, and expectations

Plan to meet each day from 9:00-11:00 am and from 1:00-2:00 pm. On a few occasions we may go past 2:00 pm, and at least twice you will have individual meetings with me after class, so it would behoove you to keep 2:00-3:00 pm clear at all times. In addition, we may spend one or more days away from campus. On these days, plan on spending more time doing class activities than the amount of time listed above. Class will be a mixture of lecture, discussion, and problem solving. We will have occasional labs, activities, and demonstrations as discussed below.

Prompt attendance at all class sessions is expected, although attendance will not specifically count in the grade. Active participation in class is expected, and you will get more from the class if you are more involved. Reading the course materials more than once is strongly recommended; reading physical chemistry takes more 'work' than other types of reading.

During discussions of the literature, I expect active participation from all class members even if another student is leading the discussion.

Point distribution and explanation

ECQs, class participation, and group work		50
Leading discussions	2@50	100
Proposals	1@50, 1@150	200
Laboratories, activities, and demonstrations		50

Problem sets	3@50	150
Exams	2@150	300
Total		850

End of Class Questions (ECQs): At the end of class sessions, I will often ask you to write down one or a few questions you have regarding the material covered so far. I will then often begin the next session by addressing one or more of these questions. There are no ‘stupid questions.’ As stated above, you must be an active participant in discussions of the literature.

Leading discussions: This section contains two different types of discussion leading. First, we will all take turns leading discussions of the primary literature in physical chemistry. Articles will be chosen largely by me, although you will have more input as the course progresses. A large fraction of the points here will be allocated based on how well you prepared to lead the discussion and how you facilitate the discussion. I will begin by modeling discussion leading, and I expect our discussions will get more involved as the course progresses. Second, you all have substantial control over the material in the second part of the course. Here, after your material coverage proposal is approved (see below), you will be responsible for presenting some of the material for that day. Roughly speaking, you will be responsible for one-fourth of that day’s material while I will be responsible for the other three-fourths. The exact schedule (and hence your presentation day) will be determined after the material coverage proposals are approved. Each person will meet with me before their presentation day to arrange the details of your presentation and our sharing of the material.

Proposals: There will be two proposals of unequal weight. First, as mentioned above, you will write a material coverage proposal for a topic to cover in Part II of the course. You will choose from a list I provide or propose your own topic not from the list. More details will follow, but you can expect to write a few pages justifying your choice of material to cover. This proposal will be worth 50 points. Note: if your proposal stinks I reserve the right to skip your material coverage idea and instead assign you a topic to present. You do not want me to do this. Second, by the end of the block I will expect an oral research proposal based on the current literature. This proposal builds on the article discussions we will do all block. Each person will choose a topic, get the topic approved, present the key points of *a few* background articles, and then propose a related line of inquiry that would be the next logical step. You will present and defend your proposal to the class. Your presentation should be no more than 15 slides. There would then be a discussion involving the entire class, and the presenter will need to be able to defend his or her choices for the next steps. For the proposal a simple report will be due after your presentation which includes the basic background, your central idea for the next steps, a summary of the discussion, and a response to critiques of the next steps. This report will be no more than three pages. We will talk more about this process during the course, and I will model everything I expect by doing an oral research proposal myself. This proposal will be worth 150 points.

Labs, activities, and demonstrations: Expect to carry out a few or activities or demonstrations during the block. Besides active participation, I expect a one-page summary of each exercise. I expect good concise scientific writing, but you will not do formal lab reports.

Problem sets: Working together on problem sets is appropriate and even encouraged; science is a collaborative endeavor. However, be certain that the work you hand in is your own (see below). You must be able to solve problems to understand physical chemistry.

Exams: There will be one covering each section of the course material. Exam 2 will not be comprehensive.

Standing bonus point offer: The first person to notify me, in writing, of a textbook error will receive bonus point(s). The number of points will depend on the severity of the error as well as the total number of errors found during the block.

Grading

Cutoffs will be no higher than:

A-/B+	750
B-/C+	650
C-/D+	550
D-/F	450

Cutoffs may be lower depending on the difficulty of the exams.

Miscellaneous

Students wishing to drop on the 15th day must have faithfully attended and participated in class, including assignments and exams.

Late work will not be accepted, and makeup exams will not be given. If you need to miss class, let me know ahead of time; if the reason is good the assignment in question may be excused at my discretion. Please contact me if you are having difficulty with the course or if a serious sickness/incident occurs during the block.

Cornell College is committed to providing equal educational opportunities to all students. If you have a documented learning disability and will need any accommodation in this course, you must request the accommodation(s) from me as early as possible and no later than the third day of the term. Additional information about the policies and procedures for accommodation of learning disabilities is available at: http://cornellcollege.edu/academic_affairs/disabilities/.

Any student with a situation which could affect your learning (e.g., health condition, serious family trouble) must contact me by the third day of the term. Student Affairs staff members do not automatically notify faculty members concerning student health issues. You must inform me due to safety concerns in the lab.

As mentioned above, working on homework sets (as well as lab exercises) together is appropriate. However, academic and scientific misconduct will be dealt with harshly. Examples include, but are not limited to, ‘collaborating’ on exams, illegal material stored in your calculator, submitting another’s work as your own, and falsification of lab data. **Any** question about what is (or is not) appropriate in academia or science should be directed to me.

Schedule

Below is a tentative schedule of topics. This schedule is flexible, but there are certain topics that I want to cover. The readings listed are chapters from Atkins & de Paula 8e, with supplemental readings and journal articles to be assigned soon. More specifics regarding which sections in the text are most important will also be given in class.

Part I: solids, surfaces, nanoscience, forces, lasers

Week 1

Day 1	M	8 Jan	A&dP 20	9 am: solids
2	T	9 Jan	A&dP 20	9 am: solids 1 pm: Article Discussion #1
3	W	10 Jan	A&dP 19,25	9 am: surfaces 1 pm: Article Discussion #2
4	R	11 Jan	A&dP 19,25	9 am: surfaces 1 pm: Article Discussion #3
5	F	12 Jan	A&dP 19+	9 am: nanoscience 1 pm: Article Discussion #4

Week 2

6	M	15 Jan	A&dP 18	9 am: forces between chemical species 1 pm: Article Discussion #5
7	T	16 Jan	A&dP 14	9 am: lasers 1 pm: Article Discussion #6
8	W	17 Jan		9 am: Exam 1

Part II: Student choice material

9	R	18 Jan		9 am: lecture/discussion 1 pm: Article Discussion #7
10	F	19 Jan		9 am: lecture/discussion 1 pm: Article Discussion #8

Week 3

11	M	22 Jan		9 am: lecture/discussion 1 pm: Article Discussion #9
12	T	23 Jan		9 am: lecture/discussion 1 pm: Article Discussion #10
13	W	24 Jan		9 am: lecture/discussion 1 pm: Article Discussion #11
14	R	25 Jan		9 am: lecture/discussion 1 pm: Article Discussion #12
15	F	26 Jan		9 am: lecture/discussion 1 pm: Sample mini-proposal

Week 4

16	M	29 Jan		9 am: presentation of mini-proposals 1 pm: presentation of mini-proposals
17	T	30 Jan		9 am: presentation of mini-proposals and review
18	W	31 Jan		9 am: Exam 2