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CHMY 573.01: Advanced Physical Chemistry

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Chmy 573 Advanced Physical Chemistry

Autumn 2015

(Dated: August 31, 2015)

Instructor Xi Chu

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Lectures Tue 11:00-12:30 & Thu 2:00-3:30 CHEM 204

Office hours by appointment

Text Physical Chemistry by Engel and Reid

I. COURSE OBJECTIVES

In chemistry 573, students are trained to read and present research papers and, ultimately, to understand how a research project is designed. It is a one-semester survey class in physical chemistry, which covers thermal chemistry, kinetics, quantum chemistry, and molecular spectroscopy. For each subject we use one research paper as an example to demonstrate how basic concepts of physical chemistry are implemented in research.

II. STRUCTURE

We dedicate six sections to each paper:

1. lecture,
2. test I (open book),
3. test review,
4. presentation,
5. test II,
6. review/summary.

The first lecture for each paper is designed to describe the most important physical chemistry concepts behind the study, rather than explain the paper in detail. There will be a test

immediately following the lecture. To prepare for this first test, the student should peruse the paper. You can take notes in the margins of the paper, which may be brought to the test. Lecture notes are also allowed in the first test. Please study unfamiliar words and pay special attention to the legends and captions of all figures and tables. Summarize conclusions that can be drawn from the data and compare them to conclusions given by the authors.

Following a test review section, two students will give presentations. One will present the paper we are studying, the other one will present another topic of his/her own choice, after which there will be a second test. Only the print out of the paper and notes on it are allowed for the second test.

Each section starts with a “News minute”, in which a student is given up to 5 minutes to describe inspiring recent scientific news, publication, or progress in the lab. Please point out which element inspires you and why.

III. PRESENTATION

Each student will give two 30 minute presentations each followed by 10 minutes of questions or comments. The accuracy, breadth, clarity, and style of the presentations will be evaluated. Both the instructor and every student in the audience will evaluate and grade the presentation.

One of these presentations will be on the research paper we study in class. The other presentation will be of the presenter’s choice: an interesting journal paper, your own work in progress, or a short version of an out-of-field proposal is allowed.

A presentation starts with an introduction, which gives the background knowledge and objectives. A description of the method should follow the introduction, after which results and discussion should be presented. In these two sections the relevant theoretical basis should be given. The final section is the conclusion.

A. Accuracy

Statements regarding theoretical basis, method, data analysis, and conclusions have to be accurate.

B. Breadth

The presentation has to cover the entire scope of the paper. It cannot be truncated according to the presenter's interest and background.

C. Clarity and style

Every presenter should have her/his own style that ensures the clarity of the presentation. A few tips:

- Use graphs, animations, and figures.
- Use itemized concise statements on slides.
- Use large fonts.
- Time your presentation. Recommended 1-2 minutes/slide.

IV. EXAMS

There will be eight tests, two for each paper. Questions are designed to help in-depth understanding of the paper and related physical chemistry concepts. In the second test some of the most failed questions will reappear.

Notes in the margin of the paper are allowed in all the tests. No notes on the back or other sheets of paper, please. For the first test on each paper, lecture notes are also allowed.

V. GRADING

Four of your best tests and one of your best presentations will be counted towards your final grade. Each test or presentation is 20 points. Each missing "News minute" will result in one-point deduction. The best news of the semester will be rewarded 5 bonus points.