

# Chemistry 321: Physical Chemistry 2

Spring 2007

**Instructor:** Prof. Kevin Range

**Office:** Ulmer 417

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**Phone:** 570-893-2959

**Required materials:**

- *Atkins' Physical Chemistry*, Peter Atkins and Julio De Paula, W. H. Freeman and Co., (2006), 8<sup>th</sup> edition.
- scientific calculator (See me if you have questions.)
- safety goggles (for laboratory)

**Lecture:** MWF 11:15AM–12:05PM

Please bring your textbook and calculator to lecture.

**Laboratory:** Tuesday 2:10PM–5:00PM

Please bring *all* of the above “required materials” to lab. Please dress appropriately and follow all instructions, for your safety and that of your peers. Failure to follow safety protocols or directions from the instructor may result in your expulsion from the lab and grade penalties.

**Office hours:** Mondays 10:00AM–11:00AM

Mondays 2:00PM–3:30PM

Tuesdays 10:00AM–11:30AM

Fridays 10:00PM–11:00PM

*and by appointment*

**Course website:** [www.lhup.edu/krange/courses/chem321/](http://www.lhup.edu/krange/courses/chem321/)

**Description:** This course will explore the application of quantum mechanics to understanding chemical phenomena, with special emphasis on chemical structure and spectroscopy. The history of quantum mechanics will be briefly discussed. The postulates of quantum mechanics will be introduced and applied to simple systems. Examination of the simple, yet practically useful, harmonic oscillator and rigid rotor system will lead into discussion of hydrogenic atoms. Discussion of perturbation and variational methods will be followed by treatment of multielectron atoms. The chemical bond will be explored from a quantum mechanical point of view with application of computer simulation. Finally, the principles learned previously in the semester will be expanded and applied to rotational, vibrational, and electronic spectroscopy.

**Problems:** This class will involve extensive problem solving, both in class and on your own; individually and in small groups. There will be approximately seven problem sets and it is these problem sets that will determine most of your problem solving grade.

**Exams:** There will be approximately eight exams. The first seven exams will cover the following topics:

- I. history, introduction, and postulates of quantum mechanics
- II. particle-in-a-box, tunneling, harmonic oscillator, rigid rotor
- III. hydrogenic atoms
- IV. methods, multielectron atoms
- V. bonding, computational chemistry
- VI. symmetry
- VII. molecular spectroscopy

Tentative dates for these exams are 2007-01-29, 2007-02-12, 2007-02-19, 2007-03-19, 2007-04-06, 2007-04-16, and 2007-05-04. The final exam is scheduled for 10AM–12PM, 2007-05-08.

**Attendance:** In order to succeed in this class you must attend all lectures and labs. Failure to complete any and all laboratory exercises will result in a grade of “E” for the course. Excused absences must be acceptable and verified by LHUP.

**Student responsibilities:** You are expected to complete all assignments on time, with academic integrity, and in the manner instructed. You are expected to come to class and lab prepared and ready to participate in the day’s activities. Failure to meet these responsibilities will have a detrimental effect on your grade. Specifically, assignments that are late and/or the product of unethical conduct will receive a grade of zero. For further discussion of academic integrity see the *Student Handbook* ([http://www.lhup.edu/stulife/student\\_handbook/index.htm](http://www.lhup.edu/stulife/student_handbook/index.htm))

**Grades:** Your final percentage grade will be the weighted average of all of your coursework:

Problems	Lab	Exams <sup>a</sup>	Final	Participation
30%	30%	20%	10%	5%

<sup>a</sup>excluding the final exam

Your final letter grade will be computed from your final percentage grade using the fairly standard set of brackets to the left. The instructor *may* adjust the brackets to give a more meaningful distribution of letter grades. Such adjustments will *never* result in a lower letter grade than that obtained from the brackets to the left.

A	93–100	C+	77–79
A-	90–92	C	73–76
B+	87–89	C-	70–72
B	83–86	D+	67–69
B-	80–82	D	60–66
E <59			

**Academic integrity:** Any violation of academic integrity standards is forbidden. Violations will result in a grade of zero being assigned for the work in question and may be reported to the proper authorities. For further discussion of academic integrity see the *Student Handbook* ([http://www.lhup.edu/stulife/student\\_handbook/index.htm](http://www.lhup.edu/stulife/student_handbook/index.htm))

**Reasonable accommodations for students with disabilities:** Students with disabilities are encouraged to discuss requests for reasonable accommodations with the professor at the beginning of the semester. In order for accommodations to be provided, your disability must be verified by Dr. Reynol Junco, Director of Disability Services for Students, 104 Russell Hall, 893-2926.