SYLLABUS
PHYSICAL CHEMISTRY II

INSTRUCTOR: Prof. Mark Eberhart
Office Hours: 106B Coolgaugh Hall, MWF 2:00-3:00, other times by appointment
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TEXTBOOK: Physical Chemistry: A Molecular Approach
by McQuarrie and Simon
Some supplemental notes will be provided.

SOFTWARE: Mathematica 6.0 or later. It is strongly recommended that
you secure a license to run Mathematica on your personal
machine.

COURSE TIMES: MWF 11:00-11:50, Hill Hall 202

LAB See “Lab Schedule”

PREREQUISITES: CHGN 351

COURSE OUTLINE

All students will be expected to perform the Thermal Population, Iodine Vapor Pressure,
and Chemical Kinetics labs. See the lab schedule for times dates. A short lab report will be
all students, though you may work in groups. These lab reports will contribute 20% to
your final grade. There are several options available to satisfy the remaining 80% of your
grade.

• For those doing the computational chemistry option, your grade will be
determined by your ability to perform a quantum chemical calculation, and
understand and analyze the results. You will do well in the course if you set aside
~5 hrs /week to practice with the ADF software package and understand the text
material covered in Chapters 6-11. This material will be covered during the first
half of the semester.

• The first option is provided through Journaling. This option is ideal for those
who can, on a regular basis, commit 5 or more hours per week to study the
material covered in lecture and through the assigned readings. If you choose this
option, you will be expected to NEATLY keep track of the time you spend
studying and record what you learned during that time in a journal. For example,
when reading an assigned section of the book, you would record the actual time
you began reading and the time you finished e.g. February 1, Section 6.2 began
7:15 pm finished  8:00 pm. You would then summarize what you had learned e.g.
Section 6.2 deals with the wavefunctions to the Rigid Rotator and are found by solving the Schroedinger equation. I did not follow much of the math, but understood that the wavefunction is called a spherical harmonic. This function depends on two variables, $\theta$ and $\phi$. Spherical harmonics also depend on two quantum numbers, $l$ and $m$, where $l$ is called the angular momentum quantum number and $m$ is the magnetic quantum number. The larger the value of $l$, the faster the rigid rotator is rotating. I do not understand the physical significance of the magnetic quantum number and will ask about this in class.

Your summary should be brief and to the point. When grading your journal, I will be looking for how much time you spent in study and whether the time spent was reasonable. This does not mean that you should try to fill your notebook up to convince me that you learned more than you really did. I would rather see you working two hours to fully understand one concept than two hours to skim for facts. Be honest with your time and spend it trying to understand. If you choose this option, bring you journal to class and labs, as I may ask for it at any time.

- Your second option is to do two projects, if you wish you may work in groups. I will provide several suggested projects and you may suggest your own. However, the project must have specific applications to quantum and or statistical mechanics. As a way of keeping you on track, you will be required to submit outlines and provide progress reports at regular intervals. Your first project will be due after spring break and the second during Dead Week. I will take the last fifteen minutes of lecture during the first week of February to give overviews of the projects.

- Your third option is to take three tests that will cover lecture material and assigned reading. This option is ideal for people who learn by simply sitting in lecture and reading.

- Your final option is to complete one of two take home exams. The first of these will deal with material covered in Chapters 6-11, and the second will cover material from Chapters 23, 24, 25, 28, and 29. Though I will lecture over selected material from these chapters, those choosing this option will be responsible for all the materials from these sets of chapters. I will hand out the take home exams early in March; you will then have almost two months to complete one of these exams. While you are free to study in groups, the exam is to be your work. You are encouraged to come see me if you are having difficulty with any aspect of the exam, and to ask questions in lecture.

If at any time you do not feel that you are getting the help you need to be successful in this class, you should come see me. I will be more than happy to meet with you singly or in groups to help with any aspect of the class.