

Chemistry 342 Spring 2012

Dr. Mark Iannone
318 Caputo Office hours: tba
Text D.W.Ball, *Physical Chemistry*

Schedule

Week 1 Quantum chemistry, spectroscopy, chapters 11-15
Week 7 Statistical thermodynamics
Week 9 Chemical kinetics
Week 14 Surfaces

Grades are not curved. There is no extra credit.

- There will be quizzes on Fridays. They cover material through Wednesday's class.
- There will be two midterm exams and a final exam (probably ACS).
- All in-class exams are closed-book.
- Recommended practice problems will be assigned in every class. Weekly homework will be collected and graded. Homework must be neat, legible and in the order assigned.

Laboratory*	20%
Quizzes	20%
Final exam	20%
Homework	20%
Midterm exams	20%

Letter grade cutoffs: A 93%, A- 90%, B+ 87%, B 83%, B- 80%, C+ 77%, C 73%, C- 70%,
D+ 67%, D 63% D- 60%

*In order to pass Chem. 342, you must perform all assigned experiments, turn in all reports in draft and revised form and to Turnitin, and earn a lab grade of 60% or more.

Laboratory

The Chem 341 lab syllabus applies to Chem 342, with the exception of due dates and late report policies, which have changed. It is available online and you are responsible for reading it. <http://www.millersville.edu/~iannone/Syllabi/341lab.pdf>

Lab reports are turned in for my comments, then in revised form for a grade. Because this is a W course, all reports must go through this revision process even if late. The proofread draft must be turned in with the final report. An incomplete or sloppy draft will have to be rewritten and resubmitted as a draft, so proofread it carefully before turning it in.

The final report must be sent to Turnitin also (enrollment pwd: Orthonormal [1st character is zero], class ID 4659827). Reports are graded on quality of experimental results, scientific discussion, clarity, spelling and grammar. Lab work is generally done with a partner, but reports must be written independently.

This semester, the labs are less structured than those in 341, so prior preparation is even more important. Initially I will not require **pre-lab reports**, but you know what can happen...

The first 3 weeks are spent on the first lab. The extra time is to allow you to gather and set up all equipment and materials for your assigned experiment. You will be the expert on this experiment for the rest of the semester and can expect to be consulted by other groups.

Because of equipment constraints, everyone will be working on something different each week. Some of you will have to do an experiment before we cover the relevant theory in class, so allow extra time for report writing.

Deadlines

If a draft is turned in before 11:00 AM, the corrected draft will be available for pickup by 11:00 AM on the next weekday.

Revised lab reports are due by 8:00am on the second Monday after you are scheduled to complete the lab, at my office. There is a penalty of ***10% per day late***.

No drafts will be accepted after 4:00pm on the Friday of the second-to-last full week of classes, 4/20. (If I don't have 5 drafts by 4/23 at 4:00, you FAIL the class.) No reports will be accepted after 4:00pm on the last day of classes, 5/4.

Homework will not be accepted after the answer key has been posted.

Exceptions to these deadlines will be made only in the case of a documented excused absence. Experimental difficulties do not excuse lateness.

Absence policy

University policy: absences are excused for a) personal illness, b) death or critical illness in the family, c) participation in a university-sponsored activity, d) jury duty, e) military duties, or f) religious holidays

An excused absence requires by a typed, signed note on 8.5x11" paper, stating the date of the absences, the reason, plus documentation of the reason. This is necessary only for late assignments and missed labs, quizzes or tests.

Academic Accommodations

Any student who has been approved for special academic accommodations through the Office of Learning Services should discuss this with the instructor during the first week of classes.

Course Objectives

At the conclusion of this course, students will

- understand simple quantum mechanical systems, be able to solve numerical problems .
- understand application of HO and rigid rotor energy levels to spectroscopy
- understand quantum models of electronic structure of atoms
- understand the MO model of chemical bonding
- have an overview of modern computational chemistry methods
- understand chemical kinetics rate laws and integrated rate laws and be able to work problems and analyze data
- understand the relationship between kinetics and mechanism and be able to use kinetics to discriminate between proposed mechanisms
- understand how statistical mechanics produces thermodynamic quantities from molecular properties
- understand the basic theory of NMR spectroscopy, xray diffraction and surface phenomena
- have improved ability to work independently in lab and to carry out common procedures without detailed instructions;
- have the ability to describe, assess and discuss scientific results in writing using clear, grammatically correct English.

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Why Mathematics?

...three reasons...The first is precise definition. When a quantity is defined by an equation, one may dispute the wisdom of the definition, but rarely is there any dispute about its meaning. ... The second benefit of mathematics is the possibility of mathematical deduction. ...manipulation of symbols can produce results that are not obvious in the original concepts. The third reason for using mathematics is more subtle, and though vital in science, it sometimes seems unimportant to students. From mathematical expressions, scientists can estimate the probable error in a quantity they are calculating or measuring. This estimate can be crucial, because few scientific experiments lead to a clear "yes" or "no." [Usually the result is "perhaps."...] To be sure of the conclusion, one must be able to judge the size of the error in the measurements and to know just how big is the "perhaps."

Eisenberg and Crothers, *Physical Chemistry with Applications to the Life Sciences*