Syllabus

Physical Measurements (004:144)     Fall 2010

Instructor: Prof. Alexei Tivanski
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Office Hours in E272 CB: MW 9:30-11:00 or by appointment
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Teaching Assistants:
A01: MW 2:30-5:20 PM
Lindsay Ditzler (lindsay-ditzler@uiowa.edu)
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Office Hours in 244 CB: TBA

Department of Chemistry Contact Information:
Students in need of additional information may contact staff in the Chemistry Center (231 CB or phone: 335-1341) during normal business hours.

Lecture*: MW 1:30-2:20 PM W55 CB
Laboratory*: 004:144:A01: MW 2:30-5:20 PM 428 & 444 CB

* Aug. 23 – Sep. 22 only the lecture portion of the course (MW 1:30-2:20) and there will be no labs.

Course Materials:

• Course Web Page: WebCT (http://courses.uiowa.edu/index.html)
• Required:
  ✓ Laboratory notebook equipped with carbon copy duplicate pages
  ✓ Safety Goggles
• Recommended:
  ✓ Physical Chemistry textbook for reference (such as Physical Chemistry by Peter Atkins)

Course content:
The lecture portion of the course will provide background for the statistical treatment of experimental data (error analysis, least squares fitting, etc.). In addition, the lectures will briefly cover some of the experimental and theoretical aspects of the planned laboratory experiments.

Each student will perform 9 experiments related to various topics in physical chemistry, such as Thermodynamics, Chemical Kinetics, and Quantum Mechanics/Spectroscopy. Students will work in assigned teams on a schedule of experiments but the laboratory reports are to be prepared individually by each student.

List of Experiments:

1. Partial Molar Volume of a Salt Solution
2. Emission Spectroscopy of Quantum Dots
3. Adsorption on Mineral Surfaces Monitored by ATR-IR
4. Absorption Spectrum of a Conjugated Dye
5. Measurement of Quenching Rates using Laser Excitation
6. Vibrational-rotational Spectra of HCl and DCl
7. Theoretical Chemistry
8. Scanning Probe Microscopy: STM & AFM
9. Mass Spectrometric Measurements of Heterogeneous Catalysis

**Grading:** Your grade will be determined from reports on 9 laboratory experiments, a prelab for each experiment, a laboratory notebook, a quiz, a final project and laboratory technique.* The point distribution is provided in the table below.

<table>
<thead>
<tr>
<th>Laboratory Reports</th>
<th>9x50</th>
<th>450</th>
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<tbody>
<tr>
<td>Laboratory Notebooks</td>
<td>9x5</td>
<td>45</td>
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<tr>
<td>Prelabs</td>
<td>9x5</td>
<td>45</td>
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<tr>
<td>Quiz</td>
<td>1x25</td>
<td>25</td>
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<tr>
<td>Final Project</td>
<td>1x50</td>
<td>50</td>
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<tr>
<td>Technique</td>
<td>1x15</td>
<td>15</td>
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<td><strong>Total Points</strong></td>
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<td><strong>630</strong></td>
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*Students must complete all of the experiments and must hand in all of the lab reports in order to pass the course. Plus and minus grades will be awarded.*

**Laboratory Reports:** A separate laboratory report is due at the beginning of the laboratory period one week after the experiment is scheduled to be completed. The laboratory report should basically correspond to the format described in the Laboratory Manual (pages 4-5) and in Garland, et al., Chaps. 1 and 2. Late reports will be penalized at a rate of 10 points for each week late.

**Laboratory Notebooks:** The notebook should contain the prelab, experimental details and observations, and the original experimental data. Important observations might include such details as the make and model of commercial equipment or the purity and source of the chemicals used. Follow the guidelines in the Laboratory Manual (page 3) or in Garland, et al., Chapter 1 for the preparation of the notebook. Also, peruse Chapter 2 for a discussion of how to present data in terms of significant figures, reported errors, etc. Be sure to mount all original graphical, numerical and spectrometer output in your notebook. Only permanently bound notebooks, with numbered pages and capable of making carbon copies, are to be used. The carbon pages will be part of each laboratory report. The notebook will be handed in along with the last report.

**Prelabs:** The prelab is a brief description of the experiment to be performed and should be written in the notebook. The carbon copy of the prelab is handed in at the beginning of the scheduled period for the particular experiment and will not be accepted late.

**Quiz:** The quiz will cover various aspects of data analysis and statistics and will be given at the end of the lecture portion of the course.

**Final project:** The final project will consist of a written report describing a proposed experiment, including a discussion of the theoretical and experimental details and a budget. It will be due at the end of the semester.

**Laboratory technique:** Points dependent on general laboratory skills, preparation and participation will be awarded by the TA/instructor on a discretionary basis.

**Attendance:** Prompt laboratory attendance is mandatory. Only University approved absences are permitted and appropriate documentation is required. Arrangements for making up the missed laboratory work must be made with the instructor within one week of the missed laboratory period.
Safety: Safety goggles must be worn at all times in the laboratory. All other safety precautions, as posted on the door to the laboratory, such as proper attire, must be adhered to. No food or drinks are allowed in the laboratory.

Laboratory Etiquette: Students should leave all glassware, equipment and bench tops in good condition when they are finished. Problems with equipment should be reported to the instructor or teaching assistants as soon as possible. Students may lose points for leaving their laboratory areas in unsuitable condition. Students are financially responsible for the damage or destruction of equipment and glassware.

Regrades: If you feel that an error was made in the grading of your work, you may request a regrade by notifying the instructor within one week of receiving the graded material. The request should be in writing and indicate the section of the material that is in question. Please note that the entire report or quiz may be subject to a re-grade.

Computer Center: Most of the data analysis will be facilitated by a computer. The 20 Macintosh and PC workstations in the Chemistry Computer Facility, 235 CB, will be available to students for the duration of the semester. Access to the Facility is via an electronic cardkey system activated with a University ID card. Word processing, spreadsheet, plotting, and data analysis software is available on all computers.

Complaints, Proper Conduct, and Modifications:

This course is given by the College of Liberal Arts. This means that class policies on matters such as requirements, grading, and sanctions for academic dishonesty are governed by the College of Liberal Arts. Students wishing to add or drop this course after the official deadline must receive the approval from the office of the Dean of the College of Liberal Arts.

Students with special needs or disabilities that may require some modification of seating, testing, or other class requirements, should see Prof. Tivanski so that appropriate arrangements may be made. (Please see the Student Disability Services web site for more information.)

Please inform the instructor and/or teaching assistant if you have any complaints about the course. If you feel that your complaints have not been resolved, follow the procedure described in the Rights and Responsibilities section of the Student Academic Handbook.

Students will usually perform laboratory experiments in groups. However, work that is handed in for a grade should represent the individual student's work and should not be copied or contain plagiarizations. If necessary, review the College of Liberal Arts policy on plagiarism and cheating.

The instructor will respond to student questions via e-mail with a typical response time of two working days. In addition, general notices concerning the course may be sent to students by electronic mail. Due to privacy considerations, the official University e-mail address (firstname-lastname@uiowa.edu) as listed on the class roster will be used for all communications. Each student is considered to be on notice for information sent to their official e-mail address. (Please see the policy at the Division of Student Services.)

Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community have a responsibility to uphold this mission and to contribute to a safe environment that enhances learning. Incidents of sexual harassment should be reported immediately. See the UI Comprehensive Guide on Sexual Harassment at www.uiowa.edu/~eod/policies/sexual-harassment-guide/index.html for assistance, definitions, and the full University policy.

In severe weather, the class members should seek shelter in the innermost part of the building, if possible at the lowest level, staying clear of windows and free-standing expanses. The class will continue if possible when the event is over.