Physical Measurements: Chem 3440 (4:144)
Fall 2012

The University of Iowa
The College of Liberal Arts and Sciences
Department of Chemistry

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Wed. 12:30 – 1:30 pm or by appointment

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Thalini Rupasingh
Office Hours: Th 11:30am – 12:30 pm E208 CB
F 9:30 – 10:30 am E208 CB

Nadeesha Rathuwadu

Lecture: MW 1:30 – 2:20 pm W268 CB
Laboratory: 004:144:A01 MW 2:30 – 5:20 pm W428 & W444 CB
004:144:A02 TTh 2:00 – 4:50 pm W428 & W444 CB

Course Materials:
- Course web site: (https://icon.uiowa.edu)
- Required:
  ✓ Laboratory Manual for Physical Measurements by Mark Young, Renée Cole, and Alexei Tivanski, August 2012. (available through Courseload; access from ICON)
  ✓ Laboratory notebook equipped with carbon copy duplicate pages
  ✓ Safety goggles
- Recommended:
  ✓ Physical Chemistry textbook
- Optional:

*SAFETY NOTE* Goggles and shoes that completely protect the foot must be worn in the laboratory at all times. Violation of this policy without the express permission of the instructor will result in dismissal from the lab and a grade of zero for that lab period.
Description of Course
The lecture portion of the course will provide background for the statistical treatment of experimental data (error analysis, graphical analysis, etc.). In addition, the lectures will cover some of the experimental and theoretical aspects of the planned laboratory experiments. Each student will perform a number of experiments that have been selected to represent various techniques and concepts of relevance to physical chemistry and which utilize modern instrumentation.

Each student will perform 8 experiments and design one additional experiment that have been selected to represent various techniques and concepts of relevance to physical chemistry, including thermodynamics, kinetics, quantum mechanics, and spectroscopy. Laboratory experiments provide for the development of technical skills as well as critical thinking and analytical skills. Students will work in assigned teams on a schedule of experiments, but the laboratory reports are to be prepared individually by each student unless otherwise instructed.

Objectives and Goals of the Course
This course seeks to develop skills and knowledge required by graduates of a chemistry program (and scientists in general). Specifically, students should gain skills in their ability to …

- Collect, analyze, and apply information to solve problems
- Use various laboratory techniques and/or instruments with understanding, accuracy, precision, and safety.
- Think logically within a chemistry framework and be receptive to new ideas and concepts.
- Develop testable theories and plan experiments.
- Use the language and concepts of chemistry to communicate effectively in oral and written form, to follow detailed instructions, and to function in independent and collaborative settings.
- Read and interpret chemical literature.
- Exhibit the ethical use of knowledge, materials, and procedures.

Grading:
Your grade will be determined from reports on 8 laboratory experiments, a prelab assignment for each experiment, an assessment of the laboratory notebook, a quiz, contributions to the laser experiment, laboratory technique, and peer review activities. Plus and minus grades will be awarded.

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
<th>Total</th>
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<tbody>
<tr>
<td>Laboratory Reports</td>
<td>8 x 50</td>
<td>400</td>
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<tr>
<td>Laboratory Prelab</td>
<td>8 x 10</td>
<td>80</td>
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<tr>
<td>Laboratory notebook</td>
<td>8 x 5</td>
<td>40</td>
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<tr>
<td>Experiment design project</td>
<td>1 x 50</td>
<td>50</td>
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<tr>
<td>Peer review of reports</td>
<td>2 x 10</td>
<td>40</td>
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<tr>
<td>Quiz</td>
<td>1 x 20</td>
<td>20</td>
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<tr>
<td>Laboratory technique</td>
<td>1 x 20</td>
<td>20</td>
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<tr>
<td><strong>Total Points</strong></td>
<td></td>
<td><strong>630</strong></td>
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Laboratory Reports
Separate laboratory reports must be completed for each experiment and should correspond to the format described in the Laboratory Manual and in Garland et. al., Chapters 1 and 2. The laboratory report is due at the beginning of the laboratory report one week after the experiment is scheduled to be completed. For reports undergoing review and revision, the revised reports will be due one week after receipt of the reviews. Late reports will be penalized at a rate of 10 points for each week late.

Laboratory Prelab
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 must be handed in at the beginning of the scheduled period for the particular experiment and will not be accepted late. Students may not begin an experiment prior to submitting the prelab. The prelab is expected to include the following components:

- Title of the Experiment
- Question being answered/addressed by completing the experiment
- Safety
  - List any safety concerns that should be considered when working with specific chemicals, equipment, or procedure.
  - Look up the MSDS for every chemical that will be used in the lab and write a brief sentence about the hazards of each chemical.
  - Include extra precautions that will be taken during lab (fume hoods, gloves, etc.) ***Writing “wear goggles, proper clothing, etc” is not sufficient***
- Procedure
  - Create a procedure that can be followed in lab with all relevant information.
  - You must include data tables for recording data during the experiment. Take time to think about the data you will collect and how it should be organized.
  - If you need to make changes to your procedure during the lab, simply mark one line through a mistake and initial next to it.
- Answers to any prelab questions

Laboratory Notebooks
Your laboratory notebook is the means by which you convey to the reader (your instructor/TA in this case) what you have done, learned and understood when completing an experiment. Keeping a lab book is an essential part of "doing good science". Therefore, you will want the contents of your lab book to be organized, neat, and easy to read, and reflect your understanding of the experiment. Other than sharing data with your lab partner(s), never allow other students to copy from your lab book or otherwise obtain information from your lab book. See the University Policy for a discussion of plagiarism.

The laboratory 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 and/or in Garland et. al, Chapter 1 for the preparation of the notebook. Also, read 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 with the last report.

**Experiment Design Project**
All students will contribute to the development of a new experiment using femtosecond time-resolved spectroscopy. The final product will be a joint effort of the entire class using a course wiki. Each student is responsible for contributing to the literature review, explanation of the instrumentation, experimental protocol, data analysis, and discussion section. Each student is also expected to contribute to the editing process with thoughtful, constructive comments.

**Peer Review of Reports**
You will provide peer review for two laboratory reports. Part of scientific communication is the peer-review process for providing a critique of research results before they are widely disseminated. You will use the author/reviewer guidelines for chemistry journals to prepare a written review of lab reports for two different experiments.

**Quiz**
The quiz will cover various aspects of data analysis and statistics.

**Laboratory Technique**
Points dependent on general laboratory skills, preparation, and participation will be awarded by the TA/instructor on a discretionary basis. Points will be deducted for inappropriate laboratory behavior.

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**Course Policies**

**Course Attendance**
Prompt laboratory attendance is mandatory. You are expected to be in the laboratory during scheduled laboratory times even if you are not actively collecting data. Only University approved absences are permitted and appropriate documentation is required. Arrangements for making up the missed laboratory work must be made with Prof. Cole within one week of the missed laboratory period. If at all possible, arrangements should be made before missing a laboratory period.

**Safety**
Safety goggles and appropriate clothing and footwear 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 permitted in the laboratory. Violation of this policy without the express permission of the instructor will result in dismissal from the lab and a grade of zero for that lab period.

**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 TAs 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 glassware and equipment.

**Regrades**
If you feel that an error was made in the grading of your work, you may request a re-grade 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 document may be subject to re-grade.

**Communication**
The instructor will respond to student questions via email with a typical response time of two working days (and often sooner). In addition, general notices concerning the course will be posted on ICON and/or sent to students using email. Due to privacy considerations, the official University of Iowa email address 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 email address.

**Resources for Students**

**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.

**Writing Center**
Students may find the Writing Center useful for this course.
Writing Center: [http://www.uiowa.edu/~writingc/](http://www.uiowa.edu/~writingc/)
The College of Liberal Arts and Sciences

Administrative Home - The College of Liberal Arts and Sciences is the administrative home of this course and governs matters such as the add/drop deadlines, the second-grade-only option, and other related issues. Different colleges may have different policies. Questions may be addressed to 120 Schaeffer Hall, or see the CLAS Academic Policies Handbook.

Electronic Communication - University policy specifies that students are responsible for all official correspondences sent to their University of Iowa e-mail address (@uiowa.edu). Faculty and students should use this account for correspondence (Operations Manual, III.15.2. Scroll down to k.11).

Accommodations for Disabilities - A student seeking academic accommodations should first register with Student Disability Services and then meet privately with Prof. Cole to make particular arrangements. See www.uiowa.edu/~sds/ for more information.

Academic Honesty - All CLAS students have, in essence, agreed to the College's Code of Academic Honesty: "I pledge to do my own academic work and to excel to the best of my abilities, upholding the IOWA Challenge. I promise not to lie about my academic work, to cheat, or to steal the words or ideas of others; nor will I help fellow students to violate the Code of Academic Honesty." Any student committing academic misconduct is reported to the College and placed on disciplinary probation or may be suspended or expelled (CLAS Academic Policies Handbook).

CLAS Final Examination Policies - The date and time of every final examination is announced during the fifth week of the semester by the Registrar. No exams of any kind are allowed during the last week of classes. All students should plan on being at the UI through the final examination period.

Making a Suggestion or a Complaint - Students with a suggestion or complaint should first visit with the instructor (and the course supervisor), and then with the departmental DEO. Complaints must be made within six months of the incident (CLAS Academic Policies Handbook).

Understanding Sexual Harassment - 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 for assistance, definitions, and the full University policy.

Reacting Safely to Severe Weather - In severe weather, class members should seek appropriate shelter immediately, leaving the classroom if necessary. The class will continue if possible when the event is over. For more information on Hawk Alert and the siren warning system, visit the Public Safety website.