Instructor

Dr. Nicole Becker
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Office hours:
T 9:30 – 11:00 am
W 9:30 – 11:00 am

Teaching assistants

William Marquardt
william-marquardt@uiowa.edu

W 10:30 – 11:30 am
W 3:30 – 4:30 pm

Paul Morales
paul-morales@uiowa.edu

T 10:30 – 11:30 am
Th 10:30 – 11:30 am

Kevin Robben
kevin-robben@uiowa.edu

T 12:30 – 1:30 pm
Th 4:30 – 5:30 pm

Christopher Knutson
christopher-j-knutson@uiowa.edu

T 10:30 – 11:30 am
Th 12:30 – 1:30 pm

All TA office hours will be held in E208 CB

Lecture Component

| CHEM 3440 | MW 1:30 – 2:20 pm | E293 CB |

Lab Component

<table>
<thead>
<tr>
<th>CHEM 3440:A01</th>
<th>MW: 2:30 – 5:20 pm</th>
<th>W428 &amp; 238 CB</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 3440:A01</td>
<td>TTh 2:00 – 4:50 pm</td>
<td>W428 &amp; 238 CB</td>
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Course materials:
- Course website: [https://icon.uiowa.edu](https://icon.uiowa.edu)
- Required:
  - Laboratory manual for Physical Measurements by Mark Young, Renee Cole, and Alexei Tivanski, August 2015 (individual chapters available as pdf’s within modules on ICON)
  - Laboratory notebook equipped with carbonless copy duplicate pages
  - Safety goggles
- Recommended:
  - Physical chemistry textbook
- Optional:

SAFETY NOTE* Appropriate safety guidelines must be followed at all times, including wearing goggles and appropriate apparel. 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.

Overview 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. Most of
these will be available as short on-line videos so that students can review as appropriate for each experiment.

Each student will work as part of a team (2 – 3 students) to perform 8 experiments 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. Students will also complete assignments designed to support development of writing skills.

Objectives and goals of the course
This course seeks to develop the following knowledge and skills required by graduates of the UI chemistry program (and scientists in general). Specifically, students should progress in their:

1) Knowledge and understanding of chemistry, including a working knowledge of:
   • Quantification and the use of mathematical models in chemistry
   • The relationship between macroscopic, sub-microscopic, and symbolic descriptions of physical systems
   • Content knowledge in physical chemistry
   • Basic knowledge of laboratory practices, including knowledge concerning measurement, record keeping, data collection, data analysis and interpretation, and safety

2) Ability to evaluate and apply information, including ability to:
   • Express thoughts and results in writing
   • Engage in problem solving using the scientific method
   • Search for and evaluate information
   • Critically read and evaluate the chemical literature
   • Interpret results

3) Knowledge of the profession in society by learning about
   • The mechanics of journal publication
   • Current jobs and roles chemists occupy (what chemists do)
   • Current topics in chemistry and their societal impact
   • Ethics in science

Grading
Your grade will be determined based on your scores on the 8 laboratory experiment and scores on additional assessments. Each laboratory report will include a prelab assignment, a written laboratory report, and an assessment of the laboratory notebook. Additional assessments will include the safety laboratory activity, laboratory technique assessments, chemical literature assignments, writing assignments, and peer review activities. Plus and minus letter grades will be awarded.
The following grading scale is guaranteed if you score the minimum percentile for that range. If warranted, minor adjustments to minimum percentages may be made at the end of the semester.

90 – 100% A-range; 80 – 89% B-range; 70 – 79% C-range; 60 – 69% D-range

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
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<tbody>
<tr>
<td>Online prelab quizzes</td>
<td>35</td>
</tr>
<tr>
<td>Laboratory experiments (report + prelab write-up + lab notebook)</td>
<td>645</td>
</tr>
<tr>
<td>Chemical literature assignments</td>
<td>75</td>
</tr>
<tr>
<td>Peer review of reports</td>
<td>30</td>
</tr>
<tr>
<td>Safety</td>
<td>25</td>
</tr>
<tr>
<td>Laboratory technique</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total points</strong></td>
<td><strong>830</strong></td>
</tr>
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</table>

* This is a laboratory course. Students must complete all of the experiments in order to receive a grade higher than D.

**Laboratory reports**

Separate laboratory reports must be completed for each experiment. A guide for general expectations for laboratory report is posted on ICON. Different experiments will have different report formats (see table below). Requirements for each report type will be posted on ICON.

<table>
<thead>
<tr>
<th>Report type</th>
<th>Required for</th>
<th>Points</th>
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</thead>
<tbody>
<tr>
<td><strong>Long</strong></td>
<td>2 out of CMS, EK, CIC</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>2 out of AFM, CO, CD/QD</td>
<td></td>
</tr>
<tr>
<td><strong>Short</strong></td>
<td>1 out of CMS, EK, CIC</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>1 out of AFM, CO, CD/QD</td>
<td></td>
</tr>
<tr>
<td><strong>Memo series</strong></td>
<td>Spartan lab</td>
<td>75</td>
</tr>
<tr>
<td><strong>Analysis report</strong></td>
<td>PMV lab</td>
<td>50</td>
</tr>
</tbody>
</table>

The laboratory report will be due one week from the last day scheduled for the experiment. Lab reports will be submitted through the assignments tab in ICON as a pdf, with accompanying files as appendices.

Following the peer review activity, you will be asked to review feedback from your peers and revise your lab report based on feedback you receive. For reports undergoing review and revision based on peer feedback, the revised report will be due one week after receipt of the reviews. Late reports will be penalized at a rate of 3 pts per day late, up to 50% of the possible points.

**Laboratory Prelab**

The laboratory prelab has two components:

- An online ICON quiz (5 pts) (this will be used for 7 of the 8 experiments).
- A written portion (10 pts)

The online quiz is based on the prelab videos and safety issues pertaining to the lab and must be
completed before lab (a specific time will be determined by your TA).

The written portion of the prelab is a brief description of the experiment to be performed and should be written in the lab notebook. Students may not begin an experiment prior to completing both components of the prelab.

The written portion and the online quiz must be submitted online to the appropriate assignment drobox on ICON 24 hours before your scheduled lab. Late prelabs will not be accepted.

The written prelab component must include the following:

- Title of the experiment
- Question being addressed by the experiment
- Safety analysis
  - Discussion of potential risks and hazards
  - Appropriate personal protective equipment (PPE) and procedures to minimize risks and hazards
- Procedure
  - Create a procedure that can be followed in lab and detail what data you will collect
  - You must create tables you will use to record data during the experiment. Take time to think about what data you will collect and how it should be organized.
- Answers to any prelab questions

**Laboratory notebooks**

Your laboratory notebook is the means by which you convey what you have done when completing an experiment. Keeping a lab book is an essential part of “doing good science.” Therefore, the contents of your lab notebook should be organized, neat, easy to read, and reflect your understanding and activities during the completion of the experiment. Other than sharing data with your lab partner(s), never allow other students to copy from your lab notebook without permission of the instructor. See the University policy for further discussion of academic honesty and plagiarism.

The laboratory notebook should contain the prelab, experimental details and observations, and the original experimental data. Important observations might include details such as the make and model of commercial equipment, or the purity and source of chemicals used. Follow the guidelines in the Laboratory Manual for the preparation of your lab notebook. Be sure to note all original graphical, numerical, and spectrometer output in your notebook.

Only notebooks with numbered pages and carbonless copy functionality are to be used. The duplicate pages will be scanned and turned in together with the written laboratory report (in ICON) and will count up to 5 pts towards the experiment grade. Note: this means you will keep the duplicate pages in your notebook for your records.

**NOTE: To make a correction to your prelab procedure during lab:** If you need to edit your procedure during the lab (e.g. due to feedback from TA or peers), simply mark one line through the part that needs to be corrected and initial next to it.
**Chemical literature assignment**
You will complete a series of assignments that will be designed to foster skills in reading and critiquing the chemical literature.

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

**Laboratory technique**
You will be awarded points based on your demonstrated laboratory skills, preparation for each lab, and participation by your TA/instructor. Points will be deducted for inappropriate laboratory behavior.

**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.

Collaboration

Pre-lab: Students in a team may collaborate on collecting information and answering questions. However, each student is required to write their own answers in their respective laboratory notebooks. Students should NOT simply copy a teammate’s answers.

Lab-notebook: Each student should record data and observations in their own notebook. It is expected that all members of a team will use the same data.

Individual lab reports: Students in a team may collaborate on analyzing data and finding appropriate references. However, each student should do their own calculations and writing (the only section that may look identical is the data tables). Students must write their own introduction and results/discussion sections, although discussion among partners is permitted.

Other assignments: Students are expected to work individually unless given express permission to collaborate.

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, 238 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/

The College of Liberal Arts and Sciences: Important Policies and Procedures

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 at http://clas.uiowa.edu/students/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. 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 final examination schedule for each class is announced by the Registrar generally by the fifth week of classes. Final exams are offered only during the official final examination period. 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. Once the Registrar has announced the date, time, and location of each final exam, the complete schedule will be published on the Registrar’s web site and will be shared with instructors and students. It is the student’s responsibility to know the date, time, and place of the final exam.

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.