CHEM 423: Physical Chemistry Laboratory
CHEM 424: Thermochemistry & Kinetics Laboratory
Spring 2016

Lecture (all sections): MoWe 12-12:50 pm (SLH 3)
Laboratory (CB 106)
   Section 423/1621: MoWe, 1-4 pm
   Section 423/1622: TuTh, 1-4 pm
   Section 423/1623: TuTh, 8-11 am
   Section 424/1101: Mo, 1-4 pm
   Section 424/1102: Tu, 1-4 pm
   Section 424/1103: We, 1-4 pm
   Section 424/1104: Th, 1-4 pm
   Section 424/1105: Tu, 8-11 am

Instructors
Prof. Kent M. Ervin, CB 115, 775-784-6676, ervin@unr.edu
Amy Cunningham (Mo&We pm odd labs), CB 005, 707-529-0469, amycunningham@unr.edu
Rose Kazemi (Mo&We pm even labs), CB 001, 775-784-4737 rezvank@unr.edu
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Matthew Roberson (Tu&Th pm odd labs), CB 005, 731-592-0477, matgrobe@ut.utm.edu
Pushpa Chhetri (Tu&Th am odd labs), CB 001, 775-335-6080, pchhetri@unr.edu
Drew Pohlman (Tu&Th am even labs), CB 002, 775-784-4869, apohlman@unr.edu

Office hours
Prof. Ervin’s office hours are Monday 10-11 a.m. and Wednesday 10-11 a.m. in CB 115, and by appointment or drop-in.

Laboratory teaching assistant open office hours for CHEM 423/424 are held in CB 316A:
   11 am – 12 noon, Monday, Rose Kazemi
   1 pm – 2 pm, Monday, Matthew Roberson
   1 pm – 2 pm, Tuesday, Drew Pohlman,
   11 am – 12 noon, Wednesday, Surja Ghale
   1 pm – 2 pm, Wednesday, Pushpa Chhetri
   10 am – 11 am, Thursday, Amy Cunningham

Required textbook (available for purchase in the ASUN Bookstore)

Course website: http://www.chemphys.unr.edu/chem423/
Course materials, including the syllabus, lab guidelines and handouts, lecture and laboratory assignments, and useful resources will be posted on the CHEM 423/424 homepage. Authentication is required for off-campus access to course materials:
   user: chem423  password: [provided in class or e-mail Dr. Ervin]
Course description
Training in laboratory techniques provided by experimental verification of the principles of physical chemistry.

Prerequisites
CHEM 423 prerequisites: CHEM 330, CHEM 421. Co-requisite: CHEM 422
CHEM 424 prerequisite: CHEM 421

Course goals
This course introduces experimental techniques that will be useful in future professional work and that illustrate the theoretical concepts learned in CHEM 421 and/or 422 by practical application. The lecture portion of the laboratory is designed to aid students in analyzing data and writing scientific reports and to introduce techniques and concepts that are used in the laboratory experiments.

Student learning objectives
Students successfully completing CHEM 423 or 424 should gain skills to:

- Conduct experiments to quantify thermodynamic (423 & 424), kinetic (423 & 424), or spectroscopic (423) phenomena following experimental protocols and safety guidelines.
- Quantitatively analyze the results of experiments using theoretical relationships and models.
- Evaluate and report the experimental uncertainty of quantitative measurements.
- Interpret the results of experiments in terms of physical chemistry concepts.
- Report results of experiments in the quality and form of a scientific journal article.
- Articulate and follow ethical principles in a scientific context, including professional standards of laboratory practice, the communication of literature research without plagiarism, and the crediting of collaborators.

General laboratory instructions and polices
The document General Laboratory Instructions on the course website includes detailed information on lab polices, safety, notebooks, and laboratory reports. It is hereby included by reference as part of the course syllabus.

Course email list
All CHEM 423/424 students are included on the class email list. Announcements will be distributed by email to your email address on MyNevada. Questions about the course, labs, text, lecture material, or problem sets may be mailed to Professor Ervin (ervin@unr.edu).

Lecture
Lectures will be held twice weekly for approximately the first half of the semester. All students are expected to attend the scheduled lectures. The lectures are designed to complement and supplement the required textbook and other course materials. You are responsible for all of the material covered in the assigned sections of the text and supplemental materials whether it is presented in lecture or not. In most cases, the lectures will be used only to reinforce and explain the more difficult topics and concepts.

Selected lecture topics:

- Experimental uncertainty and error propagation
- Statistical analysis and regression
- Scientific notebooks and reports
- Physical measurement methods
• Introductions to concepts explored in the experiments

Safety Training
Successful completion of the Department of Chemistry Laboratory Safety training and quiz and the University Laser Safety Training course is mandatory before starting experiments. Failure to complete the required safety training before labs will preclude you from performing the experiment and result in a grade of zero.

Laboratory Experiments
The experiments are listed on the course webpage. A “Standard Report” is required for all experiments.

There is generally a single apparatus or set of equipment for each experiment. Each student will be assigned to a group of 2-3 and the group will work through the various experiments. The experiments are not necessarily performed in numerical order; a laboratory schedule will be posted on the course homepage.

Completed experiments
A completed experiment consists of a pre-lab notebook assignment, in-lab notebook record, and a Standard Report. The Standard report will be evaluated on the basis of quality of the experimental results, skill in the analysis of the data, evidence that the student has understood the nature of the experiments, and completeness of the error discussion. Experiments are graded by the teaching assistant responsible for the experiment. All parts of the experiment (pre-lab assignment, in-lab notebook record, and Standard Report) must be completed before the experiment will be graded.

Standard Reports are due at the beginning of the laboratory period one week after the experiment has been completed. Late Standard Reports lose 5 points for each day late and no reports will be accepted that are more than one week late.

Each experiment is worth a total of 110 points with 5 points awarded for the pre-lab notebook assignment, 5 points for the in-lab notebook record, and 100 points for the Standard Report.

Formal report
A Formal Report is required in addition to the Standard Report for one experiment. The Formal Report has the form and quality of a scientific journal article. The evaluation criteria for the Formal Report are similar as for the standard reports, but also include clarity and completeness of presentation, and the quality judged as a scientific publication. Graded by the faculty instructor, the formal report is valued at 200 points. The formal report will only be graded after the standard report for the completed experiment has been submitted and graded by a teaching assistant.

The due date for the first version the Formal Report is 5 p.m. on Thursday, March 31, 2016, in CB 115. Late Formal Reports lose 10 points for each day late and no reports are acceptable more than one week late. The final version of the Formal Report, revised and corrected after the first is reviewed and graded by the faculty instructor, is due in SLH 3 at 12:30 pm on Friday May 6, 2016 in lieu of the final exam for the course. The first version is worth 100 points and the final version is worth an additional 100 points.

Subjective criteria
Up to 100 points (CHEM 423) or 50 points (CHEM 424) for the semester will be awarded on the basis of a collection of criteria which might best be described as actions consistent with a scholarly, professional, and conscientious approach toward the laboratory work of the course. These include such things as keeping a neat and up-to-date lab notebook, coming to class on time and prepared to start work on the assigned experiment, cooperating with other students and team members, practicing good laboratory housekeeping, and avoiding actions jeopardizing your safety or that of others.

**Lecture assignments**
The lecture portion will include homework assignments totaling 100 points.

**Tentative grading scheme**
The grade in CHEM 423/424 is awarded based on scores on the following assignments:

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<thead>
<tr>
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<th>CHEM 423</th>
<th>CHEM 424</th>
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<tbody>
<tr>
<td>Completed Experiments</td>
<td>12 @ 110 pts</td>
<td>6 @ 110 pts</td>
</tr>
<tr>
<td>Formal Report</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>Subjective Criteria</td>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>Lecture Assignments</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total Points</strong></td>
<td><strong>1720</strong></td>
<td><strong>1010</strong></td>
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**Grading scale**
The following percentage scores based on the total points guarantee the corresponding letter grades:
- 90-100 %  A− to A
- 80-89 %  B− to B+
- 70-79 %  C− to C+
- 60-69 %  D− to D+
- <60%  F

However, IF curving the grades based on the historical course average would result in a higher letter grade, THEN that higher grade will be assigned.

**Conduct, ethics, and scientific references**
Cheating, plagiarism or otherwise obtaining grades under false pretenses constitute academic dishonesty according to the code of this university. Academic dishonesty will not be tolerated and penalties can include canceling a student's enrollment without a grade, giving an F for the course or for the assignment. Refer to the “Academic Standards Policy” in the University General Catalog (http://catalog.unr.edu/content.php?catoid=12&navoid=3416) for the policy on student conduct, academic standards, and academic dishonesty.

For collection of experimental results, you will work in teams and each team member is expected to contribute fully and to share and record all results in their individual lab notebooks before the end of the lab. Once in-lab results are obtained, however, each student must analyze and report the results independently. Working together on lab reports with any other person is considered cheating and/or plagiarizing.

Beware of plagiarism, intentional or unintentional. Any information or ideas from other sources should be properly referenced. Concepts taken from other sources should be stated in your own words as well.
as referenced (use direct quotes with quotation marks only if the original statement is so unique that you cannot paraphrase in your own words). Use proper scientific citations, which in this course is the citation style of the American Chemical Society (ACS). A link to an online description of the ACS citation style is provided in the “Useful Resources” section of the course homepage. The full ACS Style Guide is on reserve in the De La Mare Library.

**Policy on late assignments**
Lecture assignment and Formal Report deadlines can be postponed only with prior approval of the instructor, and only with a valid excuse. General information about late penalties for laboratory assignments appear in the “General Laboratory Instructions” handout; however, your teaching assistant may have additional policies.

**Disability statement**
If you have a disability and will be requiring assistance, please contact me or the Disability Resource Center (Thompson Building, Suite 100, http://www.unr.edu/drc) as soon as possible to arrange for appropriate accommodations.

**Unauthorized recording of class activities**
Surreptitious or covert video-taping of class or unauthorized audio recording of class is prohibited by law and by Board of Regents policy. This class may be videotaped or audio recorded only with the written permission of the instructor. In order to accommodate students with disabilities, some students may have been given permission to record class lectures and discussions. Therefore, students should understand that their comments during class may be recorded.

**Academic success services**
Your student fees cover usage of the University Math Center (775) 784-4433, University Tutoring Center (775) 784-6801, and University Writing Center (775) 784-6030. These centers support your classroom learning; it is your responsibility to take advantage of their services. Keep in mind that seeking help outside of class is the sign of a responsible and successful student.