Chemistry 434W - Fall 2012
Instrumental Methods in Physical Chemistry

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Class: M 11:45-12:45 TR 8:15-11:15
Classroom: Reichardt 204, 245
Office Hours: M 3:00-4:00 W 10:00-11:00 F 9:00-10:00

Course materials
The following materials are required for the course and can be purchased in the UAF bookstore or elsewhere:

• Bound laboratory notebook

The following materials are optional and may assist the student in their studies:

• Experimental Physical Chemistry 2nd Ed. by Halpern
• Chemistry Experiments for Instrumental Methods 1st Ed. by Sawyer, Heineman and Beebe
• Experiments in Physical Chemistry 7th Ed. by Shoemaker, Garland and Nibler

Who should take this course?
The instrumental methods lab is more in depth and therefore more captivating than a chemistry lab for lower division courses. The results obtained from these labs as well as the understanding, interpretation and communication of these results in written format is of utmost importance and represents the majority of the grade. The student will need to carefully prepare, plan and execute experiments using not only the lab materials provided but also outside materials with minimal instructor direction. Chemistry 434W is a writing intensive course and requires completion of ENGL 111X, 211X and/or 213X.

Course expectations and outcomes
Students are expected to attend class as attendance will be monitored. Each day before class the student should read and digest the portions of the laboratory procedure appropriate as per the class schedule, including any supplemental reading. Active learning involves the student utilizing their sensory perception(s) to retain as much information as possible. Students are required to adhere to safe laboratory practices, keep complete laboratory notebooks and employ standard statistical analysis of their results. The goals for this course are to continue build the student’s skills solving chemical problems, reading critically, formulating questions, completing and designing laboratory experiments and especially by communicating information assimilated throughout the course via written reports and exams. Class conduct should be professional as well as respectful of the rights other students.

Grading
A total of 3142 points are possible for Chemistry 434W and are explained in the table below. Feedback is an essential part of this course, written as well as in-person review will occur throughout the semester. Grades will be posted to blackboard, which can be accessed from the UAF homepage. Class grades may be adjusted (curved) from the following schedule only in the students’ favor.
Tentative Points and Letter Grades:

<table>
<thead>
<tr>
<th></th>
<th>Max Points</th>
<th>Percentage Range</th>
<th>Letter Grade</th>
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<tbody>
<tr>
<td>Notebooks</td>
<td>600</td>
<td>100 - 90%</td>
<td>A</td>
</tr>
<tr>
<td>Draft reviews</td>
<td>342</td>
<td>89 - 80%</td>
<td>B</td>
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<tr>
<td>Lab reports</td>
<td>1200</td>
<td>79 - 70%</td>
<td>C</td>
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<tr>
<td>Project lab</td>
<td>400</td>
<td>69 - 60%</td>
<td>D</td>
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<tr>
<td>Oral presentation</td>
<td>300</td>
<td>59% or less</td>
<td>F</td>
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<td>DUCK exam</td>
<td>300</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>3142</strong></td>
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- Notebooks and lab maintenance (600 points) – Entries with observations, data, calculations and outline as well as cleanup for each of the labs will be worth 100 points. Prior to lab the chemicals, supplies and equipment for the lab should be recorded. Notebooks may be collected at anytime during each lab period. Notes, observations and details found on paper not bound in lab notebooks will be discarded.

- Draft lab reviews (342 points) – The first 2 lab exercises will require a typed draft report worth 171 points to assess student writing skills. Lab reports are to be submitted before the start of the lab period on the specified due date. The labs will be graded as follows:
  - 50% for written portion (ACS format, grammar, ability to express scientific thought)
  - 30% for presentation of data (figures, tables, and corresponding captions)
  - 20% for data analysis and results (precision and accuracy)

- Lab reports (1200 points) – Each of the 6 lab exercises requires a typed journal style report worth 200 points. Lab reports are to be submitted before the start of the lab period on the specified due date. The labs will be graded as outlined above.

- Project lab reports (400 points) – Lab plans (oral/written) and reports are to be submitted before the start of the lab period on the specified due date and will be graded as outlined above.

- Final project presentation (300 points) – You and your partner will present a 30 minute slide presentation about the theory, design, implementation, analysis, and results of the project. The oral presentations will be held during the final exam period.

- Final exam (300 points) – Students will be evaluated with the American Chemical Society Diagnostic of Undergraduate Chemical Knowledge (DUCK) exam. Details of taking the examination will be given in class. The examination scores will be used to assist the department in assigning awards.

**Lab policies**

Students are expected to be familiar with all components of the labs in order to spend the lab time on experimental work. Completion of raw data acquisition should be followed by data analysis for
the remainder of the lab period. Time for data analysis, discussion and composition of lab reports is built into the schedule and requires the student’s attendance for all lab periods. Additional time to complete the experiment for instrumentation or wet chemical laboratories will require the student to obtain approval from the instructor with at least 24 hours advanced notice. In the case that scheduled office hours are not convenient please feel free to stop by or make an appointment.

Working together on the labs is encouraged, however each student needs submit their own work for the written sections, data analysis, figures, tables, captions and references. Explicitly shared work is prohibited. Regrades are permitted if the student feels a mistake has been made in grading. This request should be submitted in writing for the entirety of the paper to be graded again. Regrade requests must be made within 48 hours of return of the laboratory report. Note that points lost due to late work, tardiness in lab, unexcused absences, shared lab reports or failure to clean up cannot be remitted. Also note that all assignments, excluding oral presentations, must be typed. Handwriting on any part of the reports will not be accepted. Late assignments will be assessed a 10% penalty per day.

**Additional coursework details**

Mandatory draft lab reports are required for the first two labs. Please note you will have the option to turn in draft lab reports for the remaining labs, these drafts also are due at the start of lab as noted on the accompanying schedule. Optional draft reports that are late will not be edited.

The laboratories this semester will concentrate on spectroscopy while surveying the fundamentals of physical chemistry, thermodynamics, kinetics and quantum mechanics. The first class of each week will focus on background literature, journal club presentations and review of the lab including any modifications and expectations for the written report. This presentation helps to focus laboratory time for completing the experiment rather than procedural details.

The final experiment is a semester long *planned project* where the student and their partner will pick and execute an experiment developed of their own design followed by submission of a journal style manuscript. The student and their partner will give a slide presentation that should focus on the theory, design, implementation, analysis and results of the project lab.

**Final exam**

No use of a cell phone, pda, graphing calculator or otherwise will not be allowed during the final exam. The final exam will be a one hour multiple choice exam provided by the American Chemical Society Examinations Institute. Many review text are available and are excellent sources of information to assist students in practicing and preparing for the final exam.

**Absences**

No make up laboratories will be allowed, an unexplained absence from a lab results in a zero. If the student anticipates an absence (intercollegiate sports, travel for military or university business) the student must talk to the professor before the lab to make possible arrangements. If the absence is unexpected (illness, family or personal calamity) the student must talk with the professor at the earliest possible opportunity. No extensions, makeup or late work will be accepted otherwise.
Ethical considerations
The Chemistry and Biochemistry Department Policy on Cheating states the following:

Any student caught cheating will be assigned a course grade of F. The student’s academic advisor will be notified of this failing grade and the student will not be allowed to drop the course.

Examples of cheating include, but are not limited to:

- Copying another student’s answer while taking a quiz or exam
- Using another student’s work while writing lab reports

Students must also adhere to UAF policies, the student code of conduct as well as the University of Alaska Honor Code which states in part:

Students will not collaborate on any quizzes, in-class exams, or take-home exams that will contribute to their grade in a course, unless permission is granted by the instructor of the course. Only those materials permitted by the instructor may be used to assist in quizzes and examinations.

Students will not represent the work of others as their own. A student will attribute the source of information not original with himself or herself (direct quotes or paraphrases) in compositions, theses, and other reports. No work submitted for one course may be submitted for credit in another course without the explicit approval of both instructors. Violations of the Honor Code will result in a failing grade for the assignment and, ordinarily, for the course in which the violation occurred. Moreover, violation of the Honor Code may result in suspension or expulsion.

Disabilities
Students with a physical or learning disability are required to identify themselves to the Disability Services office, 474-7043, located in the Center for Health and Counseling. The student must provide documentation of the disability. Disability Services will then notify the instructor of special arrangements for taking tests, working homework assignments and doing lab work.