Syllabus for Spring 2011

CHEM 459W – Advanced Experimental Physical Chemistry
(Writing Intensive)

Instructor: Dr. Bratoljub H. Milosavljevic
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Office hours: by appointment

Course Location: 332 Whitmore Laboratory

Prerequisite (strongly enforced): CHEM 457, Experimental Physical Chemistry

Course Schedule: Lab activities will be performed according to the following schedule:

1. In-Laboratory work (minimum 6 hours per week)
   8:00 am – 5:00 pm, Monday, Wednesday, Friday

2. Class meetings/presentations
   8:00 am – 10:00 pm, on the following days:
   - Monday, January 10: Organizational meeting
   - Monday, January 24: Research proposal presentations
   - Monday, February 14: Progress report presentations
   - Friday, March 4: Progress report presentations
   - Monday, March 28: Progress report presentations
   - Monday, April 18: Progress report presentations
   - Friday, April 29: Final presentations

3. Individual group meetings/discussion sessions (by appointment)
   8:00 am – 5:00 pm, Monday, Wednesday, Friday

Course Description: Clusters of laboratory experiments designed as a follow-up to CHEM 457 (Experimental Physical Chemistry) for students interested in pursuing careers in physical chemistry either in graduate school or industry.

Course Objectives: The aim of this course is to enhance students’ laboratory skills as well as data processing and interpretation. Experiments (sometimes accompanied with numerical simulations) are designed to activate the “passive” theoretical knowledge acquired in lecture courses through experimental experience, which will result in more operative skills. Particular attention will be devoted to written communication of experimental results as well as discussion and conclusions in an effective and concise manner according to the ACS journals standards.

Writing-Intensive Teaching and Learning: This laboratory course differs from previous lecture and laboratory courses with writing requirements as writing assignments in this course are designed to provide students with opportunities to significantly advance their technical writing and communication skills. Rather than writing several, unrelated laboratory reports, students will complete a variety of different types of writing assignments that culminate in a final report describing their research. For each writing assignment, students will receive multiple forms of feedback aimed at improving their writing through written instructor feedback, peer-
reviews and one-on-one, student-instructor discussions. With this feedback, students will thoughtfully review and reflect upon previous assignments as a means of improving future work. The final report demands successful completion of and refinement on subsequent writing assignments. Course writing activities will demonstrate to students the process required for writing a quality manuscript worthy of publication in peer-reviewed scientific journals.

**Required Materials:**
1. Laboratory notebook with alternate tear-out carbonless copy pages
2. Approved safety goggles
3. Flash drive (to save data from instruments)

**Laboratory Notebooks:** Students are required to keep a laboratory notebook (available in the bookstore) which has carbon-copy pages behind each page. Students will use this notebook to:
1. Take notes during meetings/discussions with the instructor.
2. Answer questions that arise during data analysis.
3. Outline plans for each experiment before entering the lab.
4. Record data and observations during experiments
   Neatly and carefully record data in ink as data is acquired in the lab. Students will put their name on each page used, date it, and specify the start and end time of their experiment. At the end of the week, students must turn in the carbon-copy pages to the course teaching assistant. As a point of note: careful versus sloppy record-keeping of lab notebooks has made the crucial difference in many billions of dollars in patent lawsuit decisions in recent years.

**Safety:** There is no substitute for safety. Safety rules are strictly enforced. Goggles or safety glasses **must** be worn in the labs at all times; we encourage you to bring your own. Because of the risk of contact with chemicals, it is important to have as much skin covered as possible. For this reason, shorts, sandals and open-toed shoes are **not** permitted to be worn in lab. Students who are not dressed appropriately will be asked to leave the lab until they are properly dressed. Absolutely no food or drink in the laboratory.

**Course management:** On the first day of classes, you will be assigned one research project.

<table>
<thead>
<tr>
<th>Writing Assignments</th>
<th>Presentation Assignments</th>
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<tbody>
<tr>
<td>Research proposal outline</td>
<td>Research proposal PowerPoint presentation</td>
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<tr>
<td>Progress reports (× 4)</td>
<td>Progress report PowerPoint presentations (× 4)</td>
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<tr>
<td>Progress report peer-reviews (× 4)</td>
<td>Final research PowerPoint presentation</td>
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<td>Final research report</td>
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The following details the writing assignments in this course:

**Research proposal outline:** During the organizational meeting, the instructor will give PowerPoint presentations on available research projects. Students will be required to take careful notes during the presentation on the project that they are assigned. Students will then generate a research proposal outline, which will require students to perform independent literature searches, to review physiochemical principles important to the proposed work and experimental techniques, and to propose possible experiments required for solving the assigned research problem. Students are required to meet with the instructor with questions regarding this assignment for **at least 4 hours** prior to the due date. Students must setup an appointment with the instructor by e-mail.
**Progress Reports:** Students will submit summaries of their research accomplishments on the dates specified above. These reports will contain processed data (in the form of graphs and tables) acquired during the period covered and discussions of data and relevant literature found during this period. In addition, students will be required to incorporate and update their discussion of data in their research proposal outline as they work toward a final research report.

**Progress report peer-reviews:** Students will be required to take careful notes during each group’s progress report presentations, paying particular attention to the scientific merits of the work being presented. From these notes, students will generate written comments about the work presented including possible suggestions for additional experiments, how the work could be improved, what was good about the work, and what they learned from the presentation.

**Final research report:** The final research report will be submitted in the form of a research manuscript according to the *ACS Style Guide: Effective Communication of Scientific Information*. This assignment will be a work-in-progress throughout the semester and will begin with the research proposal outline (described above), which will be updated as research progresses. Students will begin working on the final research report by addressing the justification for the research being proposed and by collecting relevant literature. As the data are collected and analyzed, students will think critically about their results and begin writing their discussion section.

**Lab Partners:** You will have one lab partner working with you, but the reports will be written individually. Groups will be assigned during the organizational meeting.

**Evaluation:** The tentative grade cut-offs for this semester are as follows and may be revised:

<table>
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<tr>
<th>Points</th>
<th>Grade</th>
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<tr>
<td>&lt;65%</td>
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<tr>
<td>65-70%</td>
<td>D</td>
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<tr>
<td>70-77</td>
<td>C</td>
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<tr>
<td>77-80</td>
<td>C+</td>
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<tr>
<td>80-83</td>
<td>B-</td>
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<tr>
<td>83-87%</td>
<td>B</td>
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<tr>
<td>87-90</td>
<td>B+</td>
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<tr>
<td>90-93</td>
<td>A-</td>
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<td>93-100</td>
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**Grading:** Students can earn up to 510 points during the semester; the following is the breakdown of how points can be earned:

**In-lab performance, 210 points**
15 points per week (× 14)
(As judged by quality of lab notebooks and instructor observations of lab work.)

**Writing assignments, 200 points**
- Research proposal outline 30 points
- Progress reports 20 points (× 4)
- Progress report peer-reviews 10 points (× 4)
- Final research report 50 points
**Presentation assignments, 100 points**

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
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<tbody>
<tr>
<td>Research proposal presentation</td>
<td>20</td>
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<tr>
<td>Progress report presentations</td>
<td>15 (× 4)</td>
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<tr>
<td>Final research presentation</td>
<td>20</td>
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**Academic Integrity:** Academic integrity is an essential component of your education. The following is quoted from the “PSU Faculty Senate Policies for Students” and defines academic integrity as “the pursuit of scholarly activity free from fraud and deception and is an educational objective of this institution. “Academic dishonesty” includes, but is not limited to, cheating, plagiarizing, fabricating of information citations, facilitating acts of academic dishonesty of others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with academic work of other students.” All University and Eberly College of Science policies regarding academic integrity/academic dishonesty apply to this course and the students enrolled in this course. Refer to the following URL for further details:

[http://www.science.psu.edu/academic/Integrity/index.html](http://www.science.psu.edu/academic/Integrity/index.html)

**Attendance:** CHEM 459W is scheduled for at least a 6-hour period week.

**Students with Disabilities:** If you have a disability, you are urged to speak to the course instructor early in the semester to make the necessary arrangements to support a successful learning experience. Also, you must arrange for the course instructor to receive a letter from the Office of Disability Services, 116 Boucke building, verifying that you have a disability. If you do not know who to talk to, please call 863-1807 or visit their website:

[http://www.equity.psu.edu/ods/](http://www.equity.psu.edu/ods/)

**Changes to the syllabus:** Any changes to the syllabus will be announced in lab.