

CHEM 449: Chemistry Research Methods Syllabus for Fall 2008

Instructor: Holly D. Bendorf

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Meeting Time: Monday, 3:15-4:05 in Heim 215, plus 10-12 hours of lab per week.

Office Hours: By appointment or just drop-by.

Course Description: This course focuses on the nature and practice of chemistry. Students will conduct research into a particular chemical problem with a faculty research advisor and will discuss their research at a weekly seminar. Results from the laboratory and library research will be disseminated via a poster presentation, a colloquium presentation, and a final research paper.

Text: *The ACS Style Guide: A Manual for Authors and Editors*, 3rd ed.; Anne M. Coghill and Lorrin R. Garson, ed.; American Chemical Society: Washington, D.C., 2006.

Grading Criteria

Poster	10%
Colloquium	15%
Final Paper	25%
Resume, Cover Letter and Research Summary	5%
Paper drafts, practice talks and participation (class discussion, peer reviews)	10%
Effort in Lab and Library Research	20%
Notebook and Spectra	5%
Laboratory Technique	<u>10%</u>
	100%

* Grades assigned in consultation with the research advisor.

Learning Objectives

Students who successfully complete this course will:

1. Be able to search Chemical Abstracts and access the primary literature,
2. Gain experience in conducting original chemical research, and
3. Be able to communicate the results of their research, both orally and in written form.

Attendance: Attendance at the weekly seminar is mandatory and each unexcused absence will result in a 5% reduction of the final grade. A maximum of one excused absence (must be documented by a note from physician, Dean, etc.) will be granted. You are expected to spend an average of 10-12 hours per week on laboratory work, although some of this time may be spent reading the literature and planning experiments.

Effort in laboratory and library research: This takes the form of commitment to the project with regard to *both the time and thought* dedicated to the research. This includes an evaluation of your comprehension of the project and intellectual input via discussions about the project with the research advisor or 449 instructor, research presentations, and paper drafts.

Laboratory Technique: Your mastery of techniques relevant your project will be evaluated. Included in this category are the skills necessary for the maintenance of laboratory equipment, laboratory hygiene, and safety.

Laboratory Notebook: Keeping an accurate and detailed laboratory notebook and an organized file of spectral data is of paramount importance. Each lab has a slightly different protocol for keeping a lab notebook; please follow the protocol described by your research advisor. The laboratory notebook and spectral data will be submitted to the research advisor at the end of the semester (during the semester notebooks should remain in the laboratory as much as possible).

Resume, Cover Letter and Research Summary: A resume and cover letter will be prepared along with a research summary (useful to have on job interviews). Although only one draft of the resume and cover letter are required, you are encouraged to submit additional drafts if significant changes are suggested.

Literature Search and Literature Review: The student will search the primary chemical literature for articles pertinent to his or her research topic. These articles will form the basis of a literature review that will be written and included in the final research paper.

Paper Drafts: While drafts will be returned with comments, they will not be given a letter grade *per se*. Full credit will be given for drafts that are submitted on time and are reasonably well done (they don't need to be perfect – they are, after all, drafts!). However, submitting hastily written drafts that are short on content or littered with errors will result in a reduction in the course grade. *Every draft should be checked for spelling and grammatical errors* (and the errors corrected) before it is submitted.

Research Presentations: Several research presentations are scheduled throughout the semester. Although these presentations will be somewhat informal, a reasonable degree of professionalism is expected (be prepared, knowledgeable about the project, able to describe the work in a concise and informed manner, and able to answer student and faculty questions regarding the project, etc.). Presentations will be peer-reviewed.

Colloquium and Poster: The research results will be presented to the Department of Chemistry in the form of a poster that will be exhibited on the Chemistry floor for approximately one semester. The colloquium presentation will be scheduled near the end of the semester and a practice talk will be given to the class at least two days before the colloquium.

Final Paper: A report on the research project will be written in standard ACS style (refer to papers published in the Journal of the American Chemical Society). The paper should consist of an abstract, an introduction that includes a literature review (this will be more elaborate than what you will see in a journal article), results, discussion of the results, conclusions, an experimental section, and references. We will address the particulars of each section in class and drafts of various sections will be due throughout the semester. Two drafts of the final paper are required and will be due during the last two weeks of class. The final draft of the paper will be due during finals week. I have found that at least three drafts of the entire paper are needed to ensure a final product that everyone can be proud of. **Please note that work will not be accepted after the Thursday of finals week.**

Academic Integrity: Be aware that in accordance with the College's policy on academic honesty, any work you submit must be your own. Any instances of plagiarism will be severely penalized.

Course Schedule

Please note: Your research advisor should receive a copy of *every* draft you submit for this class.

Date	Week	Topic	Reading Assignments and Preparation for Class	Research Talk
8/25	1	Course overview and expectations Preparing informal research presentations Keeping a laboratory notebook	Read Chapter 1 (Ethics)	
9/1	2	Searching the Chemical Literature Chemical Abstracts Using SciFinder	Discuss project with research advisor: - Choose search terms. - Choose substructures to be searched.	
9/8	3	Searching the Chemical Literature Substructure Searches	Read Chapter 2 (Scientific Papers), especially the section that describes the format of a paper (pages 19-24)	
9/15	4	Writing an introduction / literature review Using ISIS Draw, Figures and Schemes Citing references.	Refer to Chapters 4 (Writing Style and Word Usage), 9 (Grammar, Punctuation, and Spelling), 10 (Editorial Style), and 14 (References) as needed. Be sure to use the proper format when citing references (as described in chapter 14). Read Chapter 17 (Chemical Structures) <u>before</u> you draw structures for your paper. Consult Chapters 15 and 16 before preparing figures or tables for your paper.	
9/22	5	Resumes and Cover Letters Due: First draft of introduction / lit. review (Wed. 9/24)		Background Talks John and Kyle
9/29	6	Writing the experimental section Bring notebook and spectra Due: peer reviews of intro. (Mon. 9/29) Resume and cover letter (Wed. 10/1)	Refer to Chapters 11 (Numbers), 12 (Names for Chemical Compounds), and 13 (Conventions) as needed.	
10/6	7	Writing the experimental section Bring notebook and spectra Due: Second draft of introduction / lit. review (Mon. 10/6)		

Date	Week	Topic	Reading Assignments and Preparation for Class	Research Talk
10/13	8	Writing the Results and Discussion Section Due: Draft of experimental section (Mon. 10/13)	Chapters 4, 9, 10, 14, 15, 16 & 17 will be useful.	
10/20	9	Writing the research summary Due: First draft of R and D section (Wed. 10/22)		Current Research Talks John
10/27	10	Preparing for a Poster Presentation Due: Peer reviews of R and D section (Mon. 10/27) First draft of research summary (Wed. 10/29)	Chapters 15, 16 and 17 will be useful.	Kyle
11/3	11	Formal Research Talks – organization and presentation Due: Poster images (Mon. 11/3) R and D second draft (Wed. 11/5)		
11/10	12	Poster troubleshooting and peer review Due: Draft of poster in PowerPoint (Mon. 11/10) Second draft of research summary (Wed. 11/12)		
11/17	13	Writing an abstract Due: Final draft of poster (Mon. 11/17) First draft of complete paper (Wed. 11/19)	Read pp 21-22	
11/24	14	Colloquium practice talks		Colloquium Practice Talks John, Kyle
12/1	15	Poster session Due: Second draft of complete paper (Mon. 12/1)		

Colloquium Dates: John – Wednesday, December 3; Kyle – Friday, December 5

Third draft of final paper, if requested by research advisor or course instructor, due Monday, December 8.

Final draft of paper and any other work must be completed by Thursday, December 11.

Final drafts of the paper, poster and research talk should be submitted electronically. You advisor may also request a paper copy.