

Instructor: Dr. Charles H. Mahler, Phone 321-4351 or 322-8840 (h), mahler@lycoming.edu

Office Hours: **Heim 202**, MWF 10–11 AM, MW 1–2 PM, by appointment, or drop by.

If you have questions or comments about anything in the course, please come see me. I am ready and willing to meet with you and discuss your concerns, answer questions, explain concepts, solve problems, etc. I would rather help you to understand something before an assignment is due, than to find out you do not understand it while grading your work.

Class: **Monday** 3:15 – 4:05 PM in Heim 215. You are also required to complete 10-12 hours per week in the research laboratory, as arranged with your research advisor.

Course Description: This course focuses on the nature and practice of chemistry research. Students will conduct research into a particular chemical problem with a faculty research advisor. The results will be presented orally at chemistry colloquium and a written report on the research will be written.

Textbook: *The ACS Style Guide: A Manual for Authors and Editors*, 3rd ed.; Coghill, A.; Garson, L., Eds.; American Chemical Society: Washington, DC, 2006.

Writing-Intensive Course: CHEM 449 is designated as a W-course, meaning that it will partially fulfill the writing-intensive graduation requirement. Writing intensive courses include instruction on writing, and students in these courses will complete at least ten pages of formal writing and fifteen pages of informal writing. Formal writing assignments in this course will include an annotated bibliography, research summary, and a final research paper. Informal writing assignments will include free-writing exercises, peer reviews, and paper drafts.

Learning Goals: Students who successfully complete this course should be able to:

1. search the chemical literature effectively using tools such as Scifinder
2. access articles that have been published in the chemical literature
3. perform original chemical research in an active research laboratory
4. communicate aspects of chemical research orally
5. communicate the results of chemical research in the form of a manuscript for submission to an American Chemical Society journal and a scientific poster
6. utilize American Chemical Society style in written communication

Relevant Departmental and College Learning Goals: This course contributes to the following departmental learning goals, that: “Students who complete a major in chemistry will be able to:

1. Exhibit proficiency in the major sub-disciplines of chemistry [i.e. your research area]
2. Perform wet laboratory techniques as appropriate to the major sub-disciplines of chemistry
3. Understand and use modern chemical instrumentation
4. Exhibit integrative, problem-solving skills, such as experimental design, data manipulation, and data interpretation
5. Communicate the results of chemical investigations effectively in written and oral form
6. Search the chemical literature, evaluate the results of the search, and access desired research materials
7. Demonstrate responsible conduct in the laboratory, including laboratory safety and ethical research practices

In support of the Lycoming College mission, this course seeks to help students enrolled in it to “develop communication and critical thinking skills” and “explore ... scientific traditions” while “increasing receptivity to new concepts and perspectives”.

Grading Criteria:

Annotated Bibliography	5%
Poster	10%
Colloquium	15%
Final Paper	20%
Resume, Cover Letter and Research Summary	5%
Practice talks and Paper drafts	5%
Effort in Lab and Library Research	25%
Notebook and Spectra	5%
Laboratory Technique	<u>10%</u>
	100%

Course Grading Standard:

- A** **Mastery of essential elements and related concepts, plus demonstrated excellence or originality.**
B Mastery of essential elements and related concepts.
C Acceptable knowledge of essential elements and related concepts.
D Minimal knowledge of essential elements.
F Unsatisfactory progress.

Note: Grades are assigned in consultation with the all faculty in the Department of Chemistry. A student who habitually abuses deadlines can expect to have his or her final score lowered by at least one letter grade.

Attendance: Although attendance is not shown above, it is expected for all students, and failure to attend required class events will result in grade reductions. The student will pursue a research project under the direction of a faculty member in the Department of Chemistry. The student is expected to commit an average of 12 hours per week to the research project. This time will be divided between planning and performing laboratory work, reading of pertinent literature, and writing results in the notebook. Attendance at class is mandatory. Each unexcused absence will result in a 5% reduction of the final grade. Attendance at chemistry colloquium is also required and will result in the same penalty. A maximum of one excused absence for chemistry colloquium (must be documented by a note from physician, Provost, etc.) will be allowed.

Annotated Bibliography, Literature Search, and Literature Review: (5% of grade) We will explore methods for searching the chemical literature. The student will search the primary chemical literature for articles pertinent to his or her research topic, which will be summarized in the form of an annotated bibliography. These articles will form the basis of a literature review that will be written and included in the final research paper.

Poster: (10% of grade) The student will construct a poster using Power Point that describes the project in terms of its literature underpinnings, experimental design, results, and conclusions. Input on the quality of this final product will be solicited from the entire faculty of the Department of Chemistry. The final draft of the poster will be due no later than the last day of class. We reserve the right not to display posters that do not meet our standards.

Colloquium: (15% of grade) The student will present his/her research in the form of a chemistry colloquium near the end of the semester. This will utilize Power Point. A practice talk will be given to the class at least 2 days before the colloquium. Input on the quality of this final product will be solicited from the entire faculty of the Department of Chemistry.

Final Paper: (20% of grade) The student will prepare a written report on the research project. The report will be written in standard ACS style (refer to papers published in the Journal of the American Chemical Society) and will include a brief abstract, an introduction, background material (literature review), results, discussion of the results, conclusions, an experimental section, and references. We will address the particulars of each section in class. Drafts of most sections will be due throughout the semester. Two preliminary drafts of the final paper are required and will be due during the last two weeks of class. We have found that at least three drafts of the final paper are necessary to produce a document that is of quality required for this course. The third and final draft of the paper will be due no later than the Thursday of final exam week.

Resume, Cover Letter and Research Summary: (5% of grade) As practice for applications to graduate school and for employment in industry, students will prepare a current resume, write a cover letter for their practice application, and summarize their research to submit with their application.

Practice Talks and Paper drafts: (5% of grade) The student will present an overview of the project at the first presentation of the semester. At subsequent meetings, the student will report on the progress made on the project since the previous meeting. Although these presentations will be somewhat informal, the student is expected to present the research in an appropriate manner (the student should be well-prepared, knowledgeable about the project, able to describe the work in a professional manner, and able to answer student and faculty questions regarding the project). Presentations will be peer –reviewed. Graded presentations of research results include the poster, colloquium, and final paper, which must be submitted in draft form first, then revised.

Effort in laboratory and library research: (25% of grade) This takes the form of the student's commitment to the research project with regard to both the time and thought dedicated to the research. This includes evaluation of the student's comprehension of the project and intellectual input as determined by discussions with the research advisor regarding the status of the project.

Laboratory Notebook and Spectra: (5% of grade) The student will maintain an accurate and detailed laboratory notebook (hard-bound, all entries made in ink) and an organized file of instrumental data. The notebook and other relevant data will be turned in to the research advisor at the end of the semester.

Laboratory Technique: (10% of grade) The student will be evaluated on her mastery of techniques relevant to her project. Included in this category are the skills necessary for the maintenance of laboratory equipment, laboratory hygiene, and safety.

Academic Dishonesty: Be aware that in accordance with the College's policy on academic honesty, the work you submit must be your own and may be submitted to Turnitin.com. Any instances of plagiarism will be severely penalized and WILL be reported to the Provost.

Chemistry Research Methods 449W Course Schedule, Spring 2012

Note: Every assignment should be turned into your research advisor, as well as your course instructor

Week	Topic	Readings/Class Preparation	Presenting Students
1 (1/9)	Course overview, discussion with research advisors	Chp. 1 (ethics)	
2 (1/16)	Literature search background Literature search: Scifinder	Discuss project with research advisor. Choose search terms	
3 (1/23)	Structure searching with Scifinder Free-writing exercise: project summary	Choose substructures to be searched in consultation with research advisor; Review what you've learned about your project Chp.2 and 3 in text	
4 (1/30)	Discussion: Writing an introduction / literature review, editing references, annotated bibliography; Using Symyx Draw Due: Annotated bibliography (M)	Chp.2 and 3 in text; Refer to Chp. 14 for info on citing references	
5 (2/6)	Writing the research summary, resume, and cover letter. Due: 1 st draft of introduction / literature review (W)	Refer to Chp. 4 (writing style) and Chp. 9 (grammar)	Background Talks: Lauren, Lis
6 (2/13)	Writing the experimental section Bring notebook and spectra/data Due: resume, cover letter, and research summary (W)	Refer to Chp. 13 (experimental conventions)	Background Talks: Evan
7 (2/20)	Writing the experimental section Bring notebook and spectra/data Due: 2 nd draft of introduction/literature review (W)	Refer to Chp. 9, 10,11 for info on how to properly use/present numbers, chemical names, and symbols.	

8 (2/27)	Writing the results and discussion section Free-writing exercise: results and discussion Due: 1 st draft of sample experimental (W)	Refer to Chps. 3 and 4 (grammar, punctuation, etc.), review what you've accomplished in the lab to this point	
9 (3/5)	Preparing for a poster presentation, PowerPoint	Refer to Chps. 15,16 for info on how to properly include illustrations and tables.	
10 (3/12)	No Class—Spring Break Due: 2 nd draft of experimental (W) Due: Poster images in Isis/Chem Draw (F)		
11 (3/19)	Writing an abstract, organization of a colloquium presentation		Research Updates: Lis, Lauren
12 (3/26)	Troubleshooting posters Due: draft of poster (W)		Research Updates: Evan
13 (4/2)	Due: Finished poster presentation (W)		
14 (4/9)	Practice talks for colloquia (Lis) Due: 1 st draft of final paper (W)	Lis Feld colloquium Fri April 13	Practice Colloquia
15 (4/16)	Practice talks for colloquia (Lauren, Evan) Due: "polished near final" draft of final paper (F)	Lauren Bottorf colloquium Wed Apr. 18 Evan Holland colloquium Fri Apr 20	Practice Colloquia
16 (4/26)	Due: final draft of paper (4/26, Thursday; this is a hard and fast deadline)		