CHEM 129/BCHM 120: Research in Chemistry and Biochemistry
Fall 2011

Course Description:
This course is an opportunity for upper level chemistry and biochemistry students to receive credit for independent and/or original work which may lead to candidacy for honors. The main part of the course involves working in the laboratory under the supervision of either chemistry or RISE faculty for a minimum of 8 hours per week in addition to appropriate library research. You should already have met with your research advisor and established your schedule. If you have not already done so, it is your responsibility to contact your advisor. In addition to your independent research we will meet weekly for our research seminar which will involve discussion of research issues, your research results and current topics in chemistry. Attendance at department colloquia is also required.

Meeting Time: W 1:15 – 2:15 pm (location tbd)

Instructor: Ryan Z. Hinrichs, Ph.D.
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Phone: 973.408.3853

Office Hours: By appointment.
Open door policy: if my door is open, stop by.

Course Requirements:
Minimum 8 hours laboratory work per week.
Attend weekly seminar to discuss and present research.
Attend departmental colloquia.

Student Learning Objectives:

- Develop skills and confidence to safely collect, analyze, and interpret data to address a specific research question/hypothesis.
- Effectively search scientific databases to select appropriate articles related to your research project.
- Construct effective visual aids (e.g., charts, tables, graphs, figures, PowerPoint slides) and orally present research projects in a clear, organized, and professional manner.
- Write professional quality research reports, including extensive referencing and supporting conclusions with original data and reasoned arguments.

Your work in this course will be evaluated on the following:

Laboratory Research	34
Seminar	
Introduction	6
Data	6
Summary	16
Participation	4
Scientific Writing	
Literature search & bibliography	4
General audience assignment	2
Abstract assignment	2
Intro & data drafts (3 pt. each)	6
Final paper	20
Total	**100**

Laboratory Research:

You are required to complete a minimum of 8 hours laboratory work per week. Your research advisor will assess your work in the lab based on your ability to safely conduct your experiments, analyze and interpret data, and design control and follow-up experiments. Outstanding lab work (i.e., an "A") includes your ability to independently carry your research project forward. A general rubric is included below.

31-34	demonstrated independence and initiative (by the end of semester); able to individually analyze and interpret data and design next experiment
26-30	demonstrated initiative; able to analyze and interpret data and design next experiment with research advisor's guidance
21-25	satisfactory work; completed 8 hours research per week and made attempts to analyze and interpret data
≤ 20	incomplete and/or uninspired work; less than 8 hours per week

Seminar Presentations & Participation:

1. Introduction. This presentation should answer the following questions:
   - What question/hypothesis are you trying to address?
   - What experiments are you planning to address this question?
   - Why is this research question important?

2. Data. Present and discuss your analysis of **one piece of data** or **one result** that you have obtained in the lab – the goal being that your audience could then do a similar analysis themselves. Please include a quick overview of your project to remind the audience of your project.

3. Summary. Present and discuss your results and conclusions for your semester's research. Include an introduction and recommendations for future work and acknowledgements. These presentations will be held as part of the chemistry pizza lunch seminars.

4. Participation**:** You are expected to attend every seminar, ask questions of peer presenters, and participate in seminar discussions. The participation rubric is included below.

4	ask at least one insightful question each presentation
3	ask 1-2 insightful questions each week
2	ask 1-2 insightful questions every other week
1	rarely ask insightful questions

Scientific Writing:

All written work must be turned in as hard copies to the instructor. Ask your research advisor whether they prefer electronic or hard copies. All written work should be 12 pt. font, double spaced with 1" margins.

1. Literature search: You are expected to read 10-12 new research articles this semester that are related to your project (one a week). Some articles may be given to you by your research advisor but at least half must be located by yourself. An **annotated bibliography** will be compiled by submitting approximately one article entry each week via Moodle. (The annotated bibliography need not be double spaced.)

2. General audience assignment: On week 7, we will discuss communicating scientific reseach to a general audience. In preparation for this discussion, you must write a 400-500 word description of your research and its relevance for a general audience.

3. Anatomy of an abstract assignment: On week 10, we will discuss the structure of effective abstracts. In preparation for this discussion, you must describe the sentence-by-sentence structure of two abstracts from articles on your annotated bibliography.

4. Introduction and data drafts: You are required to submit a summary of your presentations to the instructor and your research advisor. These reports are due one week after your presentation. These reports should take the form of a draft paper, including figures and citations. You may consider starting with an annotated version of your PowerPoint presentation but in a Word document. Complete drafts turned in on time will receive a grade of 3-out-of-3. If this is your first research paper, don't worry about style and details – the goal of these drafts is to get you feedback from your instructor and research advisor. You should expect feedback from the instructor and your research advisor within two weeks.

   A comment about figures: designing effective figures is an essential aspect of scientific writing, and as such, will be evaluated in all reports and papers. You are encouraged to analyze the figures in your literature references to build a sense of how to effectively display scientific data in a graphical format.

5. Final Paper: Your final research paper should consist of an introduction, which must include extensive literature referencing (i.e., ≥12 references; if this is your second semester of research, you should have twice as many), an experimental section, and a results and discussion section. This should also include recommendations for future work and acknowledgements. You are encouraged to analyze the writing in your literature references to build a sense of how to effectively communicate scientific ideas.

Academic Accommodations:
Should you require academic accommodations, you must file a request with the Office of Educational Affairs (BC 114, extension 3327). It is your responsibility to self-identify with the Office of Educational Affairs and to provide me with the appropriate documentation from that office at least one week prior to any request for specific course accommodations. There are no retroactive accommodations.

Tentative Schedule

Week	**Topic**	
Wednesday, August 31	No class	
Wednesday, September 7	Introduction/syllabus Safety training, Mark Ostapczuk	
Wednesday, September 14	Searching scientific literature databases Meet in computer classroom (BC 1)	
Wednesday, September 21	Present single figure from research article Discuss effective figures and professional presentations	
Wednesday, September 28	Intro presentations:	1. 2.
Wednesday, October 5	Intro presentations:	3. 4.
Wednesday, October 12	Monday classes.	
Wednesday, October 19	Presenting research to a general audience	
Wednesday, October 26	Data presentations:	1. 2.
Wednesday, November 2	Data presentations:	3. 4.
Wednesday, November 9	Anatomy of an abstract	
Wednesday, November 16	Summary presentations:	1. 2.
Wednesday, November 23	Thanksgiving break	
Wednesday, November 30	Summary presentations:	3. 4.