

Chemistry 488: Undergraduate Research
Course Syllabus – Spring 2012

Course: Undergraduate Research (CHEM-488)

Location: REIC 168

Meeting Times: M or F 4:40 pm – 5:40 pm

Blackboard link: <http://classes.uaf.edu>

All course information, supporting documents, and exam scores for this course will be maintained on the UAF Blackboard website. It is therefore important that you check the site regularly for updates. Moreover, time-sensitive information and reminders will occasionally be sent to all students enrolled in the course, so it is important that you verify that your email address is correct and current.

Instructor: Dr. Brian Edmonds

Office hours: MWF 10:00 am – 12:00 pm (or by appointment)

Office: Department of Chemistry and Biochemistry
Reichardt Building (REIC)
Room 180

Research: Arctic Health Research Building (AHRB), Room 290

Phone: (907) 474-6527

E-mail: bwedmonds@alaska.edu

Preferred contact method: e-mail

Safety Officer: Emily Reiter
194A REIC
474-6748; eareiter@alaska.edu

Safety Training: **All students must complete lab safety training with the Department Safety Officer Emily Reiter (see contact info above) prior to beginning work in any laboratory.**

Course Description:

“Advanced research topics from outside the usual undergraduate laboratory offerings. The student will be required to make a presentation and turn in a final report. Research areas range from atmospheric chemistry to molecular biology. A substantial level of chemistry or biochemistry background is assumed”.

Getting Started

1. Complete safety training.
2. Visit 3 professors and discuss possible projects.
3. Choose a project and obtain approval from professor.
4. Write a project description (one-half page) and a summary of potential hazards.
5. Get signatures from your new research mentor and Emily Reiter.
6. Make copies of signature page and project description and turn in originals to Edmonds' mailbox in room 194. **Jan 31 due date!**
7. Pick up a lab notebook from room 194 and start working.
8. Attend weekly meetings to report your progress.

Course Goals:

This course is designed to enhance an undergraduate curriculum in chemistry by providing students with the opportunity to engage in research activities in the laboratories of UAF chemistry faculty.

Learning Outcomes:

Students who complete this course will have a working knowledge of the scientific process, including hypothesis development, experimental design, use of instrumentation, data collection, and reporting. Students will write a formal, final report of their study, and present a poster summarizing their work at the end of the course.

American Chemical Society Definition of Undergraduate Research:

The ACS approves our programs and gives the following definition of undergraduate research (see <http://www.uaf.edu/files/chem/CPT-BS-Guidelines2008.pdf>):

The research project should be envisioned as a component of a publication in a peer-reviewed journal. It should be well-defined, stand a reasonable chance of completion in the available time, apply and develop an understanding of in-depth concepts, use a variety of instrumentation, promote awareness of advanced safety practices, and be grounded in the primary chemical literature.

Research can satisfy up to four semester credit hours or six quarter credit hours of the in-depth course requirement for student certification and can account for up to 180 of the required 400 laboratory hours. A student using research to meet the ACS certification requirements must prepare a well-written, comprehensive, and well-documented research report including safety considerations. Although oral presentations, poster presentations, and journal article co-authorship are valuable, they do not substitute for the student writing a comprehensive report.

Number of credits:

Credits are assigned when students enroll; however, the number of credits may be changed upon consultation with the professor. Typically, 1 credit of Chem-488 is appropriate for library or small computational projects. Two credits is the minimum requirement for a research project that involves experimentation. The usual requirement is 3 credits which corresponds to 9 hours (3 hours per credit) of productive work in the laboratory each week, plus ~ 2 hours outside of lab for planning, notebook writing, interpretation, and reading.

Finding a Project:

New 488 students and students who are seeking a new project/laboratory must meet with at least 3 faculty members (see form, attached) to discuss possible research projects before a mentor is selected. As you meet with faculty members, obtain their signatures on the form. Once you have selected a mentor, obtain their signature (bottom of same form), and work with your new mentor to write up a ½-page project description (include one reference) and summary of potential hazards on a second form (also attached). Submit a hard copy or PDF of each form to Brian Edmonds (194 mailbox or bwedmonds@alaska.edu) no later than 5 pm on January 31st. Please send a copy to your mentor as well. To learn about faculty research interests, go to <http://www.uaf.edu/chem/faculty>.

Continuing Students:

Students enrolled in 488 must turn in the ½-page project description *each semester*. If procedures or materials have changed from the previous semester, also note that at the bottom of the page. This documentation is required to ensure that you and your mentor are aware of new hazards. Obtain signatures from your mentor and Emily Reiter, even if there are no substantive changes in procedures and materials.

Weekly Meetings:

Weekly meetings will begin on Friday, Jan. 3. The purpose of these meetings is to discuss your progress. You are expected to report **significant** progress each week, meaning, if you are taking the course for 3 credits, *e.g.*, describe what you accomplished during the 10 hours in lab. If nothing worked, what did you try? What activities did you engage in while waiting for an automated procedure to run, etc. To allow for illness, travel, etc, you will be allowed to “pass” on reporting at 3 of 10

meetings. For the remaining 7 meetings, you must report significant progress (washing dishes doesn't count) to earn full credit for research participation. You will either receive full credit (score of 10) or no credit (score of 0) at each of the 7 "performances". The amount of work required to earn full credit (a 10) will be scaled to the number of credits you are receiving for the course. The maximum participation score is therefore 70 points for all students.

Report:

Each semester, a final written report in journal format is required. In other words, the format is that of a manuscript submitted to a peer-reviewed journal. Discuss the particular journal format you will follow with your mentor. You are advised to begin the writing process early, say mid-semester at the latest, at which point you should be able to write drafts of the introduction/background, methods, and perhaps results. A PDF and hard copy of the final report is to be given to your mentor and instructor (Edmonds) no later than 5 pm on the last day of final exams for the semester.

Exemplary reports will, with the authorization of you AND your mentor, be made available to the public on the Department website. Moreover, an award of \$100 will be given to the student with the best report, as judged by UAF Chemistry & Biochemistry faculty. To be eligible for the award, you and your mentor must grant approval to publish the report.

Poster:

Each semester, students must present a poster showcasing their work at the end of the semester. This will occur at the department end-semester potluck/poster session. If you are a continuing student, a new poster summarizing your most recent work (that of the current semester) is required. The usual size is 36" x 36", which will be printed with department funds. A larger size may be appropriate if the poster will be presented at a scientific meeting.

Grades:

Your course grade is assigned by the instructor (Edmonds) in consultation with your mentor. The grade is determined by the quality and quantity of the research completed, and the quality of your final report and poster. It is often beneficial to discuss grading with your mentor early in the semester to determine your mentor's expectations. *A poster and research report are both required to receive a passing grade for the course.*

Component	Points Possible
Progress Presentations	70
Poster	15
Research Report	40
Total	125

The grading scale is A – F, with no +/- designation. The cutoffs between A, B, C, D, and F are 90%, 80%, 70%, and 60%, respectively.

Attendance:

Students are expected to attend the weekly class meetings, and also to attend regular lab meetings with your research group. Also, discuss a regular work schedule with your mentor and maintain this schedule throughout the semester. Regular attendance in the lab and participation in lab group meetings are *required*.

Notebook:

A research notebook must be obtained from the Department of Chemistry & Biochemistry. Do not purchase/use you own. Keep complete notes of procedures, results, names and locations of relevant files stored on computer, etc, in you notebook. It is imperative that others are able to read your notes, so write legibly. You may take your notebook home, but it must be with you in lab and must ultimately remain in the lab at the end of the semester.

Digital Data:

Digital data (NMR spectra, *e.g.*) should contain cross-references to appropriate pages in your notebook. The digital data itself (*e.g.*, IR or NMR spectra files, HyperChem files, and Excel files) should be burned onto CD and turned in to the instructor (Edmonds) at the end of the semester.

Safety:

All students must complete safety training. This involves several online safety modules with quizzes and personalized training with Emily Reiter. You must contact Emily Reiter, the department's Safety Officer in 194A (474-6748) or at eareiter@alaska.edu to schedule your training. This training must be completed before you can begin work on your project.

Safety Tips:

Do not work alone. Wear safety glasses at all times, even if you are not conducting an experiment. Do not eat or drink in the lab. Do not perform a procedure if you are unsure of what you are doing or how the instrument works. Use common sense.

Disabilities Services:

We will work with the Office of Disabilities Services (208 WHIT, 474-5655; <http://www.uaf.edu/disability/>) to provide accommodations for students with disabilities. If you have a disability and require special assistance, please contact the instructor as soon as possible to avoid delays.

End-of-Semester Lab Inspection:

At the end of the semester, students are required to complete a lab inspection checklist (attached) to ensure that chemicals are properly stored, glassware is clean and put away, etc. Complete the checklist with your mentor or with Emily Reiter and return it to the instructor (Edmonds).

University of Alaska Fairbanks
Department of Chemistry and Biochemistry
Undergraduate Research: Chem-488

Student Name: _____

UAF email address: _____@alaska.edu

Return this page with 3 or more signatures to Edmonds' mailbox in Reichardt 194 no later than **Jan. 31**.

	Signature	Date
Cathy Cahill		
Kelly Drew		
Lawrence Duffy		
Kriya Dunlap		
Brian Edmonds		
Thomas Green		
Fenton Heitzler		
William Howard		
Thomas Kuhn		
Brian Rasley		
Marvin Schulte		
William Simpson		
Thomas Trainor		

I have agreed to serve as research mentor for the above student. A brief description of the proposed research along with a statement of the associated, potential hazards is attached.

_____ Date: _____

Mentor Signature

_____ Number of Credit Hours: _____

Mentor Printed Name

The above student has completed his/her safety training and is approved to begin work on their research project.

_____ Date: _____

Emily Reiter

Write neatly on
this form or type
your own.

University of Alaska Fairbanks
Department of Chemistry & Biochemistry
Undergraduate Research, Chem-488

Name: _____ Semester: _____

Mentor: _____

Description of proposed research:

Lead-In Literature Reference:

Overview of planned laboratory procedures and materials, including a description of potentially hazardous procedures or materials.

488 Laboratory Check-Out List

Name: _____

Mentor: _____

Lab Spaces (rooms) Used: _____

Check-out performed by: _____ on ____/____/____

Approved by PI(?): _____ on ____/____/____

	Checked
Desk/office area cleared: books, files, personal items Comments:	
Turned in lab notebook/CD with data files?	
Benchtop/work area cleared Comments:	
Chemicals or solutions remaining – clearly labeled Comments:	
Samples or items in refrigerator or freezer in lab and/or in department Comments:	
Waste bottles remaining Comments:	
Dishes cleaned and returned Comments:	
Fume hoods empty and clean Comments:	
Equipment borrowed from stockroom or other labs? Returned? Comments:	
Chemicals borrowed or used up from stockroom or other labs? Comments:	
Gas cylinders returned to stockroom? Comments:	
Instruments cleaned and in good working order, no samples or waste remaining? Comments:	
Any damaged/defective/non-working equipment? List below.	
Notice any potential problems? Do you have comments or concerns? List below.	