CHEM 3500
Winter Quarter 2015

Instructor:	Associate Professor Keith Miller
Office:	SGM 105
Contact info:	phone: 303.871.7721; email: keith.miller@du.edu
Lecture Time/Location:	T,R 1:00 – 4:50PM; OLIN103 (lecture) and OLIN 225 (laboratory)
Office Hours:	By arrangement
Web Site:	Canvas will be used

REQUIRED COURSE ITEMS

Textbook:	No official text is required for the course. Articles, selected readings, and websites will be posted on the Canvas site that you will be expected to read and/or access.
Lab notebook:	All of your observations and experimental details are required to be recorded in a laboratory notebook. Conversations and potential solutions should also be recorded in the notebook. A notebook with carbonless copies, while preferred, is not required.
Computer:	A computer will be required for presentations and report writing. In addition, some activities will require the use of spreadsheet software for statistical analysis. Each student is expected to have access to a computer to complete these course requirements.
Safety apparel:	This course is laboratory based. Thus, when students are in the laboratory, all appropriate safety equipment must be used and safety guidance followed. At a minimum, that means safety glasses, pants (sweats will suffice) and closed-toed shoes will be required at all times when students are in the laboratory.

COURSE DESCRIPTION

This course focuses on applying the scientific method to real-world and timely scientific questions that are related, in some way, to chemistry and/or biochemistry. Students will be divided into project teams that are assigned a general scientific question. The team will develop a series of experiments based on a student-derived hypothesis that addresses some aspect of the question. The teams implement the experiments, interpret the results, repeat the process (if necessary), and report their results in a public presentation. A written portion of their work is prepared in the format of a journal article, with the goal of submitting the students' work to a peer-reviewed scientific journal.

GOALS OF THE COURSE

Students completing this course should demonstrate the ability to:

- Apply their knowledge and skills to develop solutions to societal challenges.
- Learn independently by exploring the scientific literature using a variety of resources.
- Develop hypotheses and test them using quantitative techniques.
- Articulate applications and the impact of chemistry in the modern world.
- Effectively communicate scientific information both verbally and in writing.

LECTURE/RESEARCH

Since this is predominantly a research-oriented course, a majority of class time will be spent in the laboratory. On occasion, lectures (45 – 70 minutes) will be held at the beginning of each class period. On Tuesdays, I will typically schedule longer lectures and/or activities to cover material that is important to all of the groups. Typical topics covered in these sessions include experimental design and setup, scientific writing, oral presentation preparation, and instrumental techniques. On Thursdays, the sessions will be more informal, and will be directed at individual group problems and/or questions. We will also attend a series of research presentations given by visiting scholars this quarter. These talks are scheduled at 4:00PM on Tuesdays and Thursdays throughout the quarter. I will inform you of the final dates of these lectures at least one week in

advance. **ATTENDENCE IS MANDATORY FOR ALL LECTURES AND RESEARCH PRESENTATIONS**.

Once projects are assigned, research by group members is expected to occur outside of the formally scheduled class time. Once groups are formed, it is the responsibility of each group to prepare a written research plan to help guide each project's progress. Included in this plan must be a research schedule that indicates when students will be in the lab. This plan must be presented and approved prior to any research being conducted in the laboratory. If deviations are expected from the plan, the group members must inform Dr. Miller as soon as possible. Research will be permissible without the physical presence of the instructor in the room; **HOWEVER, FOR SAFETY REASONS, STUDENTS ARE NEVER PERMITTED TO WORK ALONE.** Always work with other students, including students from other groups.

ASSIGNMENTS

In addition to the major research topic, assignments will be given throughout the quarter. These assignments are intended to support the research and critically thinking focus of the course as well as develop presentation skills of chemistry concepts to both scientific and general audiences. One assignment will be a science outreach project. Working in teams, students will prepare and present a science topic to the public (typically a demonstration to a young audience) during two (2), one-hour sessions at a local public library. Details will be presented the first day of class with additional details posted on Canvas. Other assignments might include short experiments ("mini-labs") that address an important technique, chemical process and/or a chemical property that supports the research project. In addition, each student will be required to complete a short evaluation and written report on at least two (2) research presentations given during the Chemistry Seminar this quarter. Within one week of attending the seminar, you will be required to submit a brief abstract on the content of the speaker's talk, and answer a few short questions; specific guidance will be provided on Canvas.

PARTICIPATION/ATTENDANCE

This course requires a significant amount of your participation! You will need to apply yourself both in and outside of assigned class periods. Thus, your participation and attendance will be graded. Attendance to all assigned class periods is expected and required. If you cannot attend class, please let me know in advance.

PRESENTATIONS

Progress presentations on your research topic will be required throughout the quarter, and a final presentation will be given during the last week of the quarter. These presentations will be graded. Each group member will be expected to contribute to all presentations. The format of the final presentation will be that of a poster session. The tentative date for the presentation is **March 10, 2014**. If you will be out of town for a University sanctioned function (e.g., athletic team or music group), you are responsible for informing Dr. Miller during the FIRST WEEK of your potential conflicts.

MIDTERM EXAM

During week 5 or 6, an exam will be given to assess your knowledge of the research process in general, of analytical techniques covered and of the details on the actual research project assigned. The specific format of the exam will be given in week 4. The exam will be given during one of the scheduled class periods.

PAPER

A research report (paper), in the format for submission to an ACS journal, will be required from each individual. The specific journal format will be selected the first week. While students will be working in groups, the ownership and responsibility of the written report is the responsibility of each student. Guidelines for report writing will be handed out early in the quarter. A draft (progress) report will be required midway through the quarter. Pay close attention to the requirements of the report and the deadline. A 10% penalty will be assessed on all reports turned in late. An additional 10% penalty will be assessed for each additional class period the assignment is late.

GRADES

At the end of the quarter, you will be graded according to your performance on your participation and attendance, presentations and papers. Your final grade will be determined by the following contributions:

Participation, assignments/labs and attendance	20%
Science Outreach Project	20%
Midterm exam	10%
Final Project Presentation	15%
Paper (progress and final)	35%
Total	100%

You will also be assigned group research spaces at the beginning of the second week. These spaces must be 1) completely cleaned, 2) all chemical waste properly handled, and 3) equipment returned before a passing grade is assigned. Your final grade will be determined by the following scale:

	A		B			C			D		
Letter	A	A-	B+	B	B-	C+	C	C-	D+	D	D-
Percentage minimum	95	90	86	82	77	74	70	65	61	57	55

The values listed in the table are the guaranteed minimum values. So, if your average is 90, you will receive an A- for the course. This applies to all grades **EXCEPT an A**. In order for you to receive an A for the course, you final paper must be ready, with the exception of minor edits, for submission to a peer-reviewed journal by the end of the final period. This requirement includes correct formatting as specified by the journal.

CELLULAR PHONE AND LAPTOP POLICY

I respect the need for each individual to stay in contact with family and friends. The use of cellular phones, however, is disrupting to the learning environment. Thus, I request that the ringers of all cellular phones be muted during class. If an emergency arises, and you need to make a call on your phone, I request that you quietly leave the room and conduct your conversation out in the hallway. Laptops are ONLY used for taking notes, researching and reading literature related to the course, and conducting experiments will be allowed.

LECTURE AND TESTING ACCOMODATIONS

I will make every effort to accommodate students diagnosed with a learning disability. I will do this in complete confidence. I do, however, request that any student requiring these accommodations inform me the first week of class. Please see the University Disability Services' website at http://www.du.edu/disability/dsp/index.html.

RELIGIOUS ACCOMODATIONS

It is University policy to grant students excused absences from class or other organized activities for the observance of religious holy days, unless the accommodation would create an undue hardship. I will do my best to accommodate your requests if you make arrangement with me *in advance* of your absence. Please examine the course syllabus for any potential conflicts with holy days and notify me prior to the end of the second week of classes of conflicts that may require your absence from class and/or prevent you from completing an assignment. More information can be found at: http://www.du.edu/studentlife/religiouslife/about-us/policy.html.

ACADEMIC DISHONESTY

While I advocate collaborative learning and teamwork, I also firmly believe that each individual should maintain the highest ethical standards in all of life's endeavors. As such, I support and will strictly enforce the Honor Code of the University of Denver. For your reference, the link to the Honor Code Student Conduct Policy and Procedures is:
http://www.du.edu/studentlife/studentconduct/media/documents/scpoliciesandprocedures20142015.pdf