

3 Prerequisites

This course is designed for students that have had an introductory course in chemistry (CHEM 101 or 111) and the introductory sequence of geology (GEOL 101/101L or GEOL 103/103L or HONS 155/155L, GEOL 105/105L or HONS 156/156L). This course can be taken in lieu of CHEM 112 for credit towards geology major. *BA students are required to take this course instead of CHEM 102.*

4 Course Goals and Structure

The main goal of this course is to help you (i) develop an understanding of basic principles of chemistry as it applies to fundamental geological and environmental processes, including distribution of elements, chemical reactions, and geochemical cycles, (ii) develop the requisite skills to apply chemistry skills to solve environmental problems, and (iii) learn how to make quantitative predictions about outcomes of chemical reactions that occur in context of environmental processes. In addition to these goals you will also learn about how to apply this knowledge in understanding of natural or human-induced environmental contamination problems. Below is the tentative schedule for this class.

Wk	Dates	Topic	Remarks
1	1/10-1/14/11	Introduction, Basic Principles	
2	1/17-1/21/11	Basic Principles	MLK Day, 1/17
3	1/24-1/28/11	Thermodynamics and Kinetics	
4	1/31-2/4/11		
5	2/7-2/11/11	Acids and Bases	Field trip, 2/12
6	2/14-2/18/11		Mid-term 1, 2/18
7	2/21-2/25/11	Redox Reactions	
8	2/28-3/4/11		
9	3/7-3/11/11		Spring break!
10	3/14-3/18/11	Carbon Chemistry	
11	3/21-3/25/11		Mid-term 2, 3/23
12	3/28-4/1/11	Isotopes, Atmosphere, and Climate	
13	4/4-4/8/11		
14	4/11-4/15/11	Water Environment	
15	4/18-4/22/11		SSM Poster Session, 04/21
16	4/25/11	Research poster presentations	Final, 5/4, 12:00-15:00

While, we will strive to cover most of these topics, the structure will be “fluid” and will change based on your interests and needs. Much of the class time during lectures will be devoted to introduction of the concepts. We will solve several critical-thinking exercises to better understand fundamental geochemical concepts. Consequently, *you must come to class prepared* by reading the appropriate book chapters and attempting to work assigned exercises. This way, you will be a full partner in the learning enterprise. *Class attendance is an important part of the process, so there will be a penalty for each class absence beyond three and for any exercises turned in late.* Bring your iclickers and use them in every class - I use iclicker data to determine your attendance each day. Excessive absences will result in a WA grade for the course (equivalent to an F.)

There is a 3-hr lab that is co-requisite with the lecture portion of the course. This lab focuses on developing basic laboratory and practical skills that are required for you to successfully analyze geochemical phenomena. All labs are mandatory and cannot be made up (except under extenuating circumstances - see below for instructions.) I will also organize one mandatory field trip outside and in lieu of scheduled class time (Saturday, 02/12) to visit a nearby site in Charleston area (Francis Marion National Forest.) On these trips you will have hands-on opportunities to learn about techniques that are used to assess basic environmental parameters.

5 Assessment

Your performance in this course will be assessed based on your understanding of geochemical concepts and applications. This will involve a combination of (i) solving critical-thinking exercises, (ii) exams, and (iii) paper and presentation associated with your research and laboratory projects.

1. Critical-thinking exercises will include solving problems and synthesis and interpretation of published data - there will be 6-7 exercises for 10% of total grade. You may collaborate with other students from this class while solving these exercises.
2. Daily in-class problem solving exercises using iclickers for 10% of total grade. Be sure to bring your iclickers to class every day. Any day you do not bring or use iclickers, your score for that will not count.
3. Two in-class mid-term exams each worth 15% of total grade (30% of total grade.)
4. Final in-class exam worth 20% of total grade.
5. Collaborative research project (with an extended abstract and poster presentation), worth 10% of total grade. The extended abstract is a 1000-word collaborative work that effectively summarizes your original research idea that can be tested in the lab. I will give you guidelines for preparing this abstract separately. Each team will prepare a poster outlining their research and present it to the entire class and other students from the program for discussion.
6. Laboratory exercises and projects, some of which will be collaborative efforts - 20% of total grade. I will inspect your lab journals on weekly basis. Your grade will also include the quality of your lab work and whether you follow all instructions given to you carefully.

6 Grades

The grade you earn by the end of the semester will be based on this scale:

A	>93	B+	87 - 90	C+	77 - 80	D+	67 - 70	F	<60
A-	90 - 93	B	83 - 87	C	73 - 77	D	63 - 67		
		B-	80 - 83	C-	70 - 73	D-	60 - 63		

7 Make-Up Policy

1. Quizzes: Students who miss class and have a valid and documented excuse may make up the missed quiz in my office immediately following the first class of their return.

2. Tests: Students who miss a test and have a valid and documented excuse may make up the missed test at the convenience of the course instructors.
3. Assignment and Project Deadlines: A 20% penalty per day will apply to any assignment, lab report, or the project that is late. In other words, if your assignment is 5 days late, it will be worth 0 points!
4. Students who are absent and wish to complete make-up work should:
 - (a) Go to the office of the Associate Dean of Students located at 67 George Street (white house next to Stern Center) to discuss absences and fill out the appropriate forms.
 - (b) Forms may also be found online at <http://studentaffairs.cofc.edu/services/absence.php> and they also can be faxed to the Associate Dean's office at 953-2290.
 - (c) Students will need documentation for health, personal or emergency situations.
 - (d) If you are on an athletic team or other school sponsored trip, the dean's office will have a documented list of student participants. Coaches or trip sponsors will have copies of the Dean's documentation for you to get to me in advance of the absence.

8 Course Product (or What you will get from this course)

On successful completion of this course, you will be able to

- Critically understand processes related to geological processes
- Interpret the behavior of naturally complex environmental systems
- Critically analyze environmental data and explain your findings and conclusions to your peers
- Integrate various basic sciences (chemistry, biology, geology, etc.) and mathematical skills to solve multidisciplinary problems
- Collaboratively develop research projects
- Develop other ancillary skills:
 - Become familiar with journals and technical sources in subject
 - Become proficient in conducting literature reviews
 - Improve your presentation and science writing skills
 - Learn how to use generic software (Excel, etc.) to analyze geochemical data

9 Keys to Success in this Course

- If you need special accommodations for your successful completion of this class, please discuss them with me.
- Ask a lot of questions in class and participate in all discussions
- Instead of specific office hours, I have an open door policy. If I am in my office, I will be happy and able to speak with you 99% of the time. It is best to ask (in person, call, or email) to make sure I am in my office. I'll leave a note with my location by my door if I've stepped out. Hydrochemistry lab is a good place to find me. . .
- This class will introduce a lot of new chemical concepts and how they apply to geological problems. Constantly think about where a new concept you've been introduced to you will apply.

- The text is required, and I strongly encourage you to read the text and review previous materials before each class, make notes, and bring in questions.
- We will move through material quickly. Note-taking skills are important, but don't try to jot everything down - I'll make notes available on OAKS.
- Even though this is a "chemistry" course, it will be fairly quantitative. We'll use basic math (algebra and very basic calculus) to solve environmental problems. Be sure to brush up on these topics and come and see me if you need additional help.
- Tests should be taken as follows: 1) Read all the questions, 2) describe how you would approach each problem in words and formulas (numbered steps are good) for as many problems as you can, 3) solve these problems using numbers, 4) go back to the problems you weren't sure of and approach them as above. Partial credit is the norm. Successful completion of step 2 will net you the most points.
- Study groups are encouraged, but you should practice on some of the problems on your own to simulate taking the actual test.
- A good bit of work will be required outside of class. Class participation does not only mean asking and answering questions in class. I strongly encourage you to ask questions where ever and when ever.
- I do not take attendance, however grades correlate strongly and positively with class attendance. This is not a first-level course - I expect that your interest in the material will keep you attending regularly. Come to class unless you are really sick.
- Stay engaged. Your grades will probably reflect your interest. Suggestions are always welcome. Don't forget to have fun in the process.

10 CofC's Honor Code and Academic Integrity

Lying, cheating, attempted cheating, and plagiarism are violations of our Honor Code that, when identified, are investigated. Each incident will be examined to determine the degree of deception involved.

Incidents where the instructor determines the students actions are related more to a misunderstanding will handled by the instructor. A written intervention designed to help prevent the student from repeating the error will be given to the student. The intervention, submitted by form and signed both by the instructor and the student, will be forwarded to the Dean of Students and placed in the students file.

Cases of suspected academic dishonesty will be reported directly by the instructor and/or others having knowledge of the incident to the Dean of Students. A student found responsible by the Honor Board for academic dishonesty will receive a XF in the course, indicating failure of the course due to academic dishonesty. This grade will appear on the students transcript for two years after which the student may petition for the X to be expunged. The student may also be placed on disciplinary probation, suspended (temporary removal) or expelled (permanent removal) from the College by the Honor Board.

Students should be aware that unauthorized collaboration—working together without permission— is a form of cheating. Unless the instructor specifies that students can work together on an assignment, quiz and/or test, no collaboration during the completion of the assignment is permitted. Other forms of cheating include possessing or using an unauthorized study aid (which could include accessing information via a cell phone or computer), copying from others exams, fabricating data, and giving unauthorized assistance.

Research conducted and/or papers written for other classes cannot be used in whole

or in part for any assignment in this class without obtaining prior permission from the instructor.

Students can find the complete Honor Code and all related processes in the Student Handbook at <http://studentaffairs.cofc.edu/honor-system/studenthandbook/index.php>.

11 The Honor Code, College of Charleston

The Honor Code specifically forbids the following:

1. Lying: knowingly furnishing false information, orally or in writing, including but not limited to deceit or efforts to deceive relating to academic work, to information legitimately sought by an official or employee of the College, and to testimony before individuals authorized to inquire or investigate conduct; lying also includes the fraudulent use of identification cards and fabrication of data, endnotes, footnotes and other information related to academic work.
2. Cheating: the actual giving or receiving of unauthorized, dishonest assistance that might give one student an unfair advantage over another in the performance of any assigned, graded academic work, inside or outside of the classroom, and by any means whatsoever, including but not limited to fraud, duress, deception, theft, talking, making signs, gestures, copying, electronic messaging, photography, unauthorized reuse of previously graded work, unauthorized dual submission, unauthorized collaboration and unauthorized use or possession of study aids, memoranda, books, data, or other information. The term cheating includes engaging in any behavior related to graded academic work specifically prohibited by a faculty member in the course syllabus or class discussion.
3. Attempted cheating: a willful act designed to accomplish cheating, but falling short of that goal.
4. Stealing: the unauthorized taking or appropriating of property from the College or from another member of the college community. Note also that stealing includes unauthorized copying of, and unauthorized access to, computer software.
5. Attempted stealing: a willful act designed to accomplish stealing, but falling short of that goal.
6. Plagiarism:
 - 6.1 The verbatim repetition, without acknowledgement, of the writings of another author. All significant phrases, clauses, or passages, taken directly from source material must be enclosed in quotation marks and acknowledged either in the text itself and/or in footnotes/endnotes.
 - 6.2 Borrowing without acknowledging the source.
 - 6.3 Paraphrasing the thoughts of another writer without acknowledgement.
 - 6.4 Allowing any other person or organization to prepare work which one then submits as his/her own.
7. Penalties (Sanctions) for Violations of the Honor Code
 - 7.1 XF Transcript Notation (See Appendix A for full description.) a) The grade of XF has been added to our grading options at the College. The grade of XF means failure due to academic dishonesty. If a student is found responsible for an act of serious academic dishonesty, the instructor for that course must assign an XF. The XF remains on the student's official transcript for a minimum of 2

years. After 2 years, the student can petition the Honor Board for removal of the X. The F will remain. b) Instructors, with assistance from the Dean of Students if requested, will assess whether the behavior of the student falls into one of three classes: Class 1 act involves significant premeditation; conspiracy and/or intent to deceive, e.g., purchasing a research paper. Penalties: XF and either suspension or expulsion assigned if student found responsible by Honor Board. Class 2 act involves deliberate failure to comply with assignment directions, some conspiracy and/or intent to deceive, e.g., use of the Internet when prohibited, some fabricated endnotes or data, copying several answers from another students test. Penalties: XF and other sanctions assigned if student found responsible by Honor Board. Class 3 act mostly due to ignorance, confusion and/or poor communication between instructor and class, e.g., unintentional violation of the class rules on collaboration. Penalties: Student and instructor agree upon the response and forward agreement to the Dean of Students. See “Class 3 Report and Resolution Form” on the Student Affairs, Honor System website.

- 7.2 Other penalties for violations of the Honor Code range up to and include expulsion from the College. Other penalties may be combined with the XF. Attempted cheating, attempted stealing, and the knowing possession of stolen property shall be subject to the same punishment as the other offenses. Because the potential penalties for an Honor Code violation are extremely serious, all students should be thoroughly familiar with the above definitions and be guided by them.

Students can find all related honor code processes in the Student Handbook at <http://studentaffairs.cofc.edu/honor-system/studenthandbook/index.php>