

Geochemistry

Fall 2008

3 credits

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Class Schedule: Lectures Monday, and Wednesday 3-4:30 pm.

Office Hours: Monday 2-3pm, Wednesday 1-3pm, or by appointment (please be aware that I am not on campus Tuesdays and Thursdays).

Text: Your text is available electronically- no need to purchase! White, W. M., 2007, Geochemistry, John-Hopkins University Press, 701 p.

<http://www.imwa.info/geochemistry/>

Important Dates: 9/9/08 = Last day to add without instructor signature; 9/30 = last day to add with instructor signature; 10/17 = last day to drop without late drop request or withdraw; Thanksgiving Break = November 26-30; Semester end = December 12; Graduation December. 13.

Grades: Your course grade will be based on a research project (60%), participation in a research seminar (20%), and problem sets (20%).

Grade scale: 92% and up = A

87-91 = AB

82-86 = B

77-81 = BC

72-76 = C

67-71 = CD

60-66 = D

<60% = F

Seminars: Toward the end of the semester, after we have become comfortable with the tools of geochemistry, groups of you will focus on some aspect of geochemistry that interests you. In the last few weeks of class, there are some lecture periods entitled "Seminar". You and your classmates will run those classes. For these classes, groups of 3 students will chose 1-2 scientific papers on a topic of interest (handed out to the entire class one class period prior to the seminar) and will facilitate a discussion of the paper(s) in class that day. The group will also be in charge of making up a 1/2-page summary of the problem that is being addressed followed by some discussion questions. They may also make overheads and should read a few extra papers on the topic to add depth to the discussion. Leading and participating in seminar is worth 20% of your grade.

Homework, in-class exercises: Problem sets will be assigned on a regular basis. Each assignment will indicate the date it is due. All assignments should be finished by the beginning of class on the date indicated. Since I expect you to turn assignments in on time, I will do my best to have them back to you in a timely fashion. From time to time, we will do some exercises in class, to help us to learn about geochemistry. Sometimes these will be graded; sometimes you'll get credit for just doing them. Homework and in-class exercises will be worth 20% of your total grade.

TENTATIVE SCHEDULE OF TOPICS (subject to change)

Week of:	Topic and readings:	Chapter in Text
Sept. 8	What is geochemistry? Elements, atoms, and the structure of matter	Chapter 1 & 2
Sept. 15 Sept. 17 Proposal Summary Due	Bonding Thermodynamic Equilibrium	Chapter 2 & 4
Sept. 22	Solutions	Chapter 3
Sept. 29	Kinetics- diffusion and advection	Chapter 5
Oct. 6 Oct. 8 Detailed Proposal Outline Due	Chemical Weathering	Chapter 6
Oct. 13	Redox Reactions	Chapter 6
Oct. 20	Stable & Radioactive Isotopes	Chapter 8 & 9
Oct. 27	Seminar Presentations	
Nov. 3	The Solid Earth System- Trace elements, The Mantle and Core	Chapter 7 & 11
Nov. 10	The Solid Earth System- The Crust	Chapter 12
Nov. 17 Proposal Draft Due	Reactions at the Earth's surface	Chapter 13
Nov. 24 Nov. 26 No Class	The Ocean System	Chapter 13 & 15
Dec. 1	Research Presentations	
Dec. 8 Dec. 10 <u>Final Proposal Due</u>	Research Presentations	

Academic Integrity: The Wisconsin Administrative Code states: "Students are responsible for the honest completion and representation of their work, for the appropriate citation of sources, and for respect of others academic endeavors." (§ UWS 14.01) Plagiarism and other forms of academic misconduct are serious offenses with severe penalties. See the [University of Wisconsin Oshkosh Student Discipline Code](#) for definitions of academic misconduct and details about procedures, sanctions, and other relevant information. Specific questions about the provisions in the Student Discipline Code should be directed to the Dean of Students Office. If you do not understand this statement, please see me as soon as possible.

FINAL PAPER DEADLINES AND GUIDELINES

Since one goal of this class is to teach you about the tools of geochemistry, your final project will be a double-spaced, 12-point font, 15 pages **MAXIMUM** (10 pages minimum, see details below) research proposal. You should propose to do some innovative research in geochemistry. I highly encourage you to pursue a question/hypothesis that interests you and that you could actually address. Students might find a project and samples in the Oshkosh area, the area around field camp, or some project sponsored by someone on the faculty – you may not, however, do something that you have already completed. This could be an excellent opportunity to start on a senior thesis project (a rewarding exercise that will prepare you for graduate school or an industry research career). The following deadlines and guidelines **ABSOLUTE** and modeled after the guidelines for proposals to the National Science Foundation.

FINAL PAPER DEADLINES

Wednesday, September 3 – Wednesday September 10: arrange 15-30 minute meeting with Kate to discuss your research topic. Come in with ideas – think about rocks that you've been curious about, or larger questions in geology that you might want to answer with geochemistry. Kate has lots of ideas – please come with an area, question, rock type, or just a granule of an idea about something geologic she'll help you with the rest. *(5% of final paper grade)*

Thursday, September 15: Preliminary research proposal summary due at the beginning of lecture. This is *limited to a one-page double-spaced* summary of the hypothesis you will test (or question you will answer), a short description of what you plan to do (to answer the geochemical question/test the geochemical hypothesis) and why it is important. It should be concise and clear, kind of like an abstract. It should also be convincing – you are a salesperson...sell your idea. The actual proposal summary may change during the course of your research – this is to show me that you have done a little bit of research about the problem and that you are progressing. *(10% of final paper grade)*

Monday October 6: Detailed proposal outline due at the beginning of lecture. This outline should include some of the information that you have gathered since our meeting at the beginning of the semester. Every good proposal includes many pages of "research" into the problem and what has already been done. Your outline should include pertinent information

about the question/hypothesis that you plan to address. The better and more detailed your outline; the more I will be able to help. This should include a list of the references you have gathered and plan to use. You should also have done some research on the expenses that you will incur as you do this work. I will be grading the outline on organization, clarity of writing, use of references. (10% of final paper grade)

Monday November 17: Proposal draft due at the beginning of lecture. This is expected to be a relatively complete rough draft of your proposal. At the very least, it should have a relatively complete geologic background that summarizes the importance of the hypothesis to be tested and gives some background in regards to the subject of your proposal. One or two of your peers will also review your proposal. You will get to review theirs as well. (25% of final paper grade – completion of peer review 10%, draft 15%)

Friday December 10, 3pm: Proposal due. You should turn in a completed proposal – make changes suggested by Kate and your peers on your rough draft, add new information, polish the rough draft, and make it fundable...This is an **ABSOLUTE** deadline. (50% of final paper grade)

Treat this as though you are a professional. In academics and industry, proposal writing will occupy a significant amount of your time; if you can do it well, you will be very successful. In this class, the final paper/proposal will make up 60% of your grade (see syllabus for details).

PROPOSAL GUIDELINES

Your proposal **MUST** be double-spaced, 12-point type, and **MUST** have the following components in this order:

1. Title page
2. Project Summary: **MAXIMUM** 1 page, double-spaced, 12-point type. The Project Summary should summarize what it is you propose to do and why it is important. **There must be a clearly stated hypothesis that you will test.**
3. Table of Contents
4. Body of Proposal: **MAXIMUM** 15 (*minimum* 10) pages (including all figures and tables), double-spaced, 12-point type. I suggest that your proposal body include:
 - a. **INTRODUCTION** to the problem/question/hypothesis. This is like an introduction to a paper – it should, as my graduate advisor used to say, “tell the audience what you’re going to tell them”. Answer the following questions: *What’s the problem? What’s been done? What will you add to the body of knowledge about your problem? Why is it important?*
 - b. **BACKGROUND** summarizing the important geology and geochemistry associated with your problem and pertinent work that has already been done in this area. You may also include a discussion of the geographic/geologic setting that you have chosen to study. ***Think of this like a mini-research paper – this will be the bulk of your proposal (up to 6-10 pages)!*** (cite early and cite often - see handout on citations for more information). *What are important bits of information that reviewers need to understand the*

importance of this work? What have other people done that provides a basis for you to build on? Why have you chosen this particular rock type/geologic area/ material/tectonic setting /environment? This part of the proposal justifies your...

- c. **PROPOSED RESEARCH** detailing what new work you will do (if you have samples, this is a great place to summarize what ground-breaking results you are already obtaining as a part of your preliminary research and how that fits in). *What do you expect to find with your proposed work? On what previous work do you base your proposed work? Why is this particular approach an appropriate one?*
 - d. **METHODS** detailing how you will do the work (generally a short paragraph for each method – including field methods, geochemical analysis, sample preparation, petrographic investigation, etc). *What geochemical techniques will you use to complete your research (you may actually have to do some research into these methods, too)? What are the steps in the procedures to prepare/analyze samples? Why are these particularly useful for your research?*
 - e. **RESEARCH SCHEDULE** detailing when the work will be completed. *How long will this work take (usually NSF limits proposals to about 3 years)? When do you plan to complete each portion of your research (is this summer work or year-round, will you be going to school too)? What will be done during each time period?*
 - f. **IMPLICATIONS OF THIS WORK** reminding us of how important this new work is (this is the part that my graduate advisor would call “Tell them what you told them”). *What will the geosciences as a whole gain from this work? What will this contribute to the broader base of knowledge in the Earth sciences?*
5. References Cited: No page limit, **single**-spaced, 12-point type, listing all references **cited** in your proposal. (I will provide a handout in reference to citations later in the course.)
 6. Budget: Detail how much it will cost to complete this research. Money is no object! However, please do a little research into reasonable costs for items (for example, \$1500 is totally unreasonable for a plane ticket to Dallas, Texas, but not for a plane ticket to South Africa). Orbitz or Expedia are great (easy) ways to get an idea of how much travel items (plane tickets, rental cars, etc) will cost. Do a Google search for other items; you can at least get an idea of cost. Your proposal will lose points (and not get funded) if you have not presented a **reasonable** budget for the proposed research.