
Geol 388 Intro to Earth's Geochemistry

Spring 2019: Tuesday & Thursday 3-415 PM, 151 Brooks Hall

Instructor: Dr. Dorothy Vesper

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(please do NOT use MIX or eCampus emails)

Office hours: Tues 430-530 PM & by apt

Course Web Site: eCampus

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GTA office hours: Mon 1-2 PM, Wed 9-10 AM,
Fri 11-12 AM

PURPOSE. Geology & chemistry are integrated and co-dependent. This course is an introduction to the big-picture of geochemistry focused on using chemical tools to understand earth processes from the very old to very new, the very small to very large.

STUDENT OUTCOMES: Upon completion of this course students will be able to do the following:

1. Understand how basic geochemical principles apply to geological processes
2. Use geochemical techniques to quantitatively interpret geologic processes
3. Interpret “real world” data relative to chemical and geologic setting
4. Construct geochemical calculations and models in spreadsheets
5. Employ effective graphics to illustrate data trends and predict chemical outcomes
6. Interpret graphics

Class format. This class will incorporate several different types of class days. To give you an idea, here are the most common ones.

- Regular lecture-based class
- Small-group activities – this may be for entire classes or parts of lecture classes
- Lab and/or computer-room days.

Is this class for you? This class may not be for everyone. You might want to consider these issues:

- To succeed in this class, you need to be present AND engaged. Getting notes afterwards from a classmate will not substitute for being involved yourself.
- We will be doing a lot of in-class activities working in small groups. This means sharing and explaining your own ideas as well as listening respectfully to other people.
- You need some flexibility. This class is still under construction – and I want to tailor it to student interests and needs – so you can expect some adjustments in the schedule and topics.

PREREQUISITES

- An introductory geology (GEOL 101) or Environmental Geology (GEOL 110) or equiv.
- An introductory chemistry class (CHEM 116 or equiv.)
- Add CS 101 Introduction to Computer Applications would be enormously helpful

Concerned about chemistry? Okay, I admit it. I didn't like my freshman chemistry class very much and retained very little knowledge. Hence I assume that you'll need to do some refreshing. I will cover some basic material in class but you will have to drag out your old text book and do some reviewing on your own as well. If you earned less than a C in intro chemistry or struggle with algebra, you will probably not be prepared for this course. If you have questions or concerns, please come talk to me.

GRADING**A couple details on grading:**

- I do not round grades. Your final grade is determined by meeting the thresholds below.
- There is no extra credit in this class (other than the 3 points above 100%). Resolve from the beginning to participate in class & complete the assignments on time – and then you won't need anything extra.
- Letter are assigned as follows:

Point Distributions by Assignment Type		
Type	Topic, Comments	% of grade
Online module	The library Plagiarism Tutorial. Completion of this task is required to get a course grade.	0
Class participation	Based on random attendance, pop checks, activity turn-in sheets, two-minute papers, & mini-assignments	8%
Assignments	This is a combination of problem sets & read-write-discuss activities. 5 Assignments @ 10% each.	50%
Short Exams	3 Exams @ 15% each.	45%
TOTAL		103 (graded out of 100)

To earn this	Get \geq this % in the class
A+	97.0
A	94.0
A-	90.0
B+	87.0
B	84.0
B-	80.0

To earn this	Get \geq this % in the class
C+	77.0
C	74.0
C-	70.0
D+	67.0
D	64.0
D-	60.0
F	Anything <60.0

TEXTBOOK AND READING MATERIALS

- **Environmental and Low Temperature Geochemistry.** Author Peter Ryan. ISBN: 978-1-4051-8612-4. 2014 by Wiley-Blackwell. You can find all of the figures and tables on the publisher's student companion site: <http://bcs.wiley.com/he-bcs/Books?action=contents&itemId=1405186127&bcsId=8933>.
- Railsback LB (2003) **An earth scientist's periodic table of the elements and their ions.** *Geology* 31:737-740. You can download the figure and associated journal article for free at the link. If you'd prefer, you can still purchase a large pre-printed copy from the GSA bookstore for about \$10. Links:
Free pdf version: <http://www.gly.uga.edu/railsback/PT.html#Availability>
GSA: <http://rock.geosociety.org/Store/detail.aspx?id=MCH092RV2>
- Additional resources selected readings will be placed on eCampus.

CLASS POLICIES

Participation. Participation data are collected randomly using a variety of means: taking class attendance, participation in in-class activities, pop checks (vaguely like a pop quiz but designed for me to see how everyone is doing), collecting data for class, etc. These may be un-graded (3 points) or "lightly-graded" (e.g., 3 pts for an excellent effort, 2 pts for a good effort, 1 pt for being present but making only a marginal effort). We will do at approximately 10 of these over the course of the semester. There are no make-up points for missed classes regardless of the reason.

Assignment deadlines. All assignments are due at the beginning of class on the due day unless otherwise specified. The penalty for late assignments is 10% per day (yep, that includes weekend days). **No credit will be given for assignments handed in after the graded assignments are returned or for pre-exercise discussions due at the time of the exercise.** Note that I try to return all items within 1 week so there is a VERY LIMITED WINDOW for late assignments. If you're having a problem, come talk to me BEFORE the deadline.

Sorry, but being sick does not give you the option of turning things in late. The same penalties apply. Plan ahead.

Assignments on eCampus. Some assignments need to be turned in via eCampus. In those cases, it is YOUR responsibility to be sure your file loaded. Double check and don't rely on your cell phone! The "I loaded it but don't know what happened" is not a valid excuse. Problems? Let me know and I'm happy to help – but that means you have to plan ahead.

Optional Final Exam. There is no required final exam for this class – however, an optional comprehensive final exam will be given during the scheduled final exam period. This acts as a make-up exam for anyone who misses an exam. It can also be taken by anyone in the class who would like to replace one of the 3 required exams with a better score = however.... If you take this exam it will replace your lowest test grade even if it is a lower score.

Academic Integrity. Some projects will be joint efforts – in which case you are encouraged to work with your classmates. Other assignments are to be completed as individuals – in which case receiving or giving help is forbidden. The detailed sheet for each assignment will specify what type of project it is so that we are absolutely clear. Unless you are specifically told that an assignment should be submitted BY THE GROUP, identical assignments will both be given a zero score.

In accordance with University policy, students who violate the course standards on independent work or engage in other dishonest practices will be penalized. Keep in mind that copying from web sites is considered plagiarism and is a dishonest practice. Guilty students may receive an "unforgivable F." For more information, see the University's website at on Academic Integrity/Dishonesty at <http://catalog.wvu.edu/undergraduate/coursecredittermsclassification/#academicintegritytext>. If you have any questions regarding these rules or specific issues, please come talk to me.

You will complete the Avoiding Plagiarism tutorial on the library's web site early in the semester – completing this is a requirement for getting a grade in the class. All students will be held accountable for the material taught in that tutorial. If you have any question about plagiarism, please talk to me.

Electronics & Integrity. You MUST NOT have any materials whatsoever (including papers, notes, memory sticks/cards, cell phones, etc.) with you during an exam. Cell phones are to be turned off and put away during a test. Anyone found using a cell or smart phone or memory stick, or even having these items visible during a test will be presumed to be cheating and will receive, at a minimum, a zero on the test. There is zero tolerance for cheating or attempted cheating.

Social Justice. The Department of Geology and Geography supports the University's commitment to social justice and will strive to maintain a positive learning environment based on open communication and mutual respect among students and faculty. If you have questions, please contact either me or our department chair, Steve Kite.

Sexual Harassment. Sexual harassment may take the form of unwanted sexual attention from someone in a position to affect your academic advancement, or it may be persistent, sexually related behavior that creates an inappropriately hostile, intimidating environment that negatively affects your ability to do course work. If you believe that you may be a victim of sexual harassment, help is available. For initial guidance, you are welcome to talk to me, our department chair Steve Kite, or the Office for Social Justice. For additional information, consult the Social Justice website: http://diversity.wvu.edu/policies/syllabus_statement

Days of Special Concern. WVU recognizes the diversity of students and understands that some may need to be absent from class to participate in religious observances. In line with university policy, you must notify your instructor by the end of the third class meeting of the semester regarding religious observances that will affect your attendance.

Students with a Disability. If you are a person with a disability and anticipate needing any type of accommodation to participate in this class, please make appropriate arrangements with Disability Services (tel. 293-6700) and advise me as soon as possible.

PREVIEW OF COMING ATTRACTIONS – SPRING BREAK WEEK CORRECTED

WEEK	TOPIC	READING & RESOURCES
Week 1 Jan 8, 10	Logistics, Intro to geochem Chemistry/math review workshop The periodic table & a few basic structures	Ryan Ch. 1 Your intro chemistry textbook
Week 2 Jan 15, 17	Chemistry & energy	Railsback (2003) Ryan Ch. 1
Week 3 Jan 22, 24	SPLIT WEEK: Excel Workshop in the computer lab The structure of water	Berner & Berner (1987)
Week 4 Jan 29, 31	Minerals	Ryan Ch.2 Hazen (2010)
Week 5 Feb 5, 7	Discussion – Hazen Periodic Table for Earth Science	Ryan Ch. 2, 4
Week 6 Feb 12, 14	Stable Isotopes EXAM #1 (PTables, Energy & Minerals)	Ryan Ch. 10
Week 7 Feb 19, 21	Kinetics (& some radio isotopes) Geochronology	Ryan Ch. 11
Week 8 Feb 26, 28	Organic Compounds - Organic Geochem – Natural, petroleum, & contamination	Ryan Ch. 3
Week 9 March 4 - 8	Aqueous Systems	Ryan Ch. 4, 5
March 11-15	Spring Break	
Week 10 Mar 19, 21	Catch-up day Thursday: EXAM #2. (Isotopes, kinetics, geochron, organics)	
Week 11 Mar 26, 28	SPLIT WEEK CO ₂ data Your local water	
Week 12 Apr 2, 4	Carbonates young and old	
Week 13 Apr 9, 11	Redox systems & WV mine waters	
Week 14 Apr 16, 18	Climate change - the scientific framework EXAM #3. (Aqueous up to Climate Change)	Outside reading
Week 15 April 23, 25	Climate change – show me the data Acidification discussion & course wrap-up (double attendance points!)	Outside reading Rice and Herman (2012)
Optional Comprehensive Exam		

Comments on the schedule: The schedule is tentative. Stay flexible and expect there to be some changes. I like to leave time for discussion, questions, and tangents that make sense.