Spring 2-1-2022

GEO 327.01: Geochemistry

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Geosciences 327: Geochemistry
Syllabus: Spring 2022

Instructor

Nancy Hinman
CHCB 316a, Office hours: MW 11:00 – noon, right after class until ~4:00 pm, and by appointment
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Course Information

Meeting time: MW 1:00-2:20 pm. Then it will be 1:00 – 2:50 MW. Note that this is different from the course listing because the course is incorrectly listed as four credits; it is three credits.
Meeting place: CHCB 304

Course Structure

This course is organized as geochemical puzzles. Each puzzle will take two to three weeks. I will introduce the concepts, as they are needed to solve the puzzles.

You will write a brief report on each problem. The report must include your answer to the question and a summary of the concepts you used answer the question. The important point is not whether you get the right answer. The important point is how you use and present the concepts to support your answer. There will be five puzzles:

Week 1:	The stellar stew
Weeks 2 through 4:	Why is the bone blue?
Weeks 5 through 7:	Why is there copper at Butte?
Weeks 8 through 9:	Why are gold and chromium not found in the same deposits?
Weeks 11 through 13:	Are all basalts the same?
Weeks 14 through 16:	Why isn't petroleum found in all marine rocks?

In addition to the reports, you will have four ***short*** assignments that illustrate some important points in a straightforward manner, one laboratory experience, and an open-book, open-notes final exam for which I will give you the questions ahead of time. We will start each assignment in class, so we are all on the right track.

Course Objectives:

- Students will learn how the organization of the periodic table applies to the chemistry of the Earth and planets.
- Students will apply quantitative approaches to solve geochemical puzzles.
- Students will apply principles of isotope geochemistry to real-world systems.

- Students will synthesize data from many sources to answer geochemical questions from local and global systems.
- Students will use datasets to solve geochemical questions spanning earth's history.

Topics to be covered (not in order)

- A geochemists view of the periodic table
- Crystal chemistry and substitution
- Isotopes – stable isotopes and radiogenic isotopes
- Geochronology
- Oxidation/Reduction
- Acid/Base
- Solubility
- Sedimentary geochemistry and diagenesis
- Magmas, phase equilibrium
- Metamorphism

Systems to be studied (not in order)

- Sedimentary systems
- Planets, moons, and smaller stuff (cosmic dust, meteorites)
- Ore deposits
- Volcanic rocks
- Carbonate rocks

Tools to use (not in order)

- Isotopes for temperature
- Isotopes for age
- Isotopes for petrogenesis
- Elemental properties for abundance and differentiation
- Elemental properties for substitution and temperature determination
- Solubility
- Redox chemistry for ore formation
- Redox chemistry for sedimentary diagenesis
- Phase diagrams

Plagiarism

"Plagiarism is the representing of another's work as one's own. It is a particularly intolerable offense in the academic community and is strictly forbidden. Students who plagiarize may fail the course and may be remanded to Academic Court for possible suspension or expulsion." (See Student Conduct Code that follows in this section of the catalog.)

"Students must always be very careful to acknowledge any kind of borrowing that is included in their work. This means not only borrowed wording but also ideas. Acknowledgment of

whatever is not one's own original work is the proper and honest use of sources. Failure to acknowledge whatever is not one's own original work is plagiarism." Source.

Accommodation of Disabilities Policy

This course follows the University of Montana EITA Policy and Procedures.