G 445/545
Geochemistry
CRN 45780(G445) / 45781(G545)
4 credits, Winter 2013

Location: Portland State University, Meets in CH 17, 9:00-10:05

Instructor: Alex Ruzicka
CH 17K, 503-725-3372
email: ruzickaa@pdx.edu
Office hours: My regular office hours are Monday 11-12 and Wednesday 11-12. Please make arrangements with me to meet outside this time.

Course Description: This course provides an overview of geochemistry with a focus on how quantitative measures can be used to better understand geological processes. Topics will include mass balance, equilibrium partitioning, element transport, geochronology, stable isotopes, thermodynamics, crystal chemistry, and cosmochemistry. Examples will be given to illustrate how geochemical principles and methods are being used to learn about the Earth and the solar system.


Problem sets: Two problem sets will be assigned during the semester. These will include problems assigned to both G445 and G545 students, as well as more elaborate problems assigned to G545 students alone.

Exams: There will be two mid-term Exams in addition to a Comprehensive Final. Students should plan on bringing calculators and a copy of the periodic table with them to class on Exam days.

Presentations: Two class periods have been allocated for oral presentations by students on any topic of interest to them related to geochemistry, petrology, or mineralogy. Oral presentations are required for G545 students and optional (for extra credit) for G445 students.

Website: A Course Website will contain a copy of this syllabus, problem sets, score distributions for problem sets and exams, a list of resources, and any relevant announcements. Note that the PSU-provided D2L web shell will not be updated. The Course Website URL is: http://web.pdx.edu/~ruzickaa/G545

Grades: Grades will be determined from performances on:

G445:
- Problem sets (10% each) .................................................. 20%
- Mid-term exams (20% each) ........................................ 40%
- Final Exam ................................................................. 40%
- Oral presentation (optional) ........................................... up to 5% extra

G545:
- Problem sets (15% each) .................................................. 30%
- Mid-term exams (15% each) ........................................ 30%
- Final Exam ................................................................. 30%
- Oral Presentation ........................................................ 10%

Grading will be assigned based on scores as follows: 95% or above = A, 90-94.99% = A-, 87-89.99% = B+, 83-86.99% = B, 80-82.99% = B-, 77-79.99% = C+, 73-76.99% = C, 70-72.99% = C-, 67-69.99% = D+, 63-66.99% = D, 60-62.99% = D-, less than 60% = F. Letter grades will conform to the standards given in the PSU course catalog (A = excellent, B = superior, C = average, D = inferior, F = failure). I generally avoid giving "I" grades.
**Students with disabilities:** If you have a disability and need an accommodation, please make arrangements with the Disability Resource Center office in SMC 435 (503-725-4150).

**Academic integrity:** It is expected that work submitted by students represents that done by the individual student themselves. Work copied from others in the class will result in zeroes for the assignment.

**Other policies:** Students who do not submit an “Acknowledgment of Syllabus Receipt” form, or who stop attending class for a long period, may be withdrawn by the Instructor. In general, late work will not be accepted, unless accompanied by a note for a doctor for illness, or unless extenuating circumstances merit exceptions from the instructor. It is the responsibility of the student to arrange both with the instructor and with PSU’s testing center (SHAC, UCB Suite 310, see [http://www.pdx.edu/testing/](http://www.pdx.edu/testing/)) any tests requiring accommodations or make-ups.

**Class schedule:** The tentative schedule is as follows (see Class Website for updates):

1/7  Introduction (Ch. 1)
1/9  Properties of elements (Ch. 1, parts of Ch. 5)
1/11 Mass balance and equilibrium (parts of Ch. 3, 8)
1/14 Equilibrium partitioning (parts of Ch. 5, 8)
1/16 Element transport
1/18 Isotope geology; geochronology (Ch. 2)

1/21 NO CLASS, MLK Holiday
1/23 Isotope geology; geochronology (Ch. 2)
1/25 Isotope geology; stable isotopes (Ch. 2)
1/28 Thermodynamics; Gibbs function, reactions, P-T space (Ch. 3)
1/30 Thermodynamics; solutions, activities, equilibrium constant (Ch. 3, parts of Ch. 5)
2/1 Thermodynamics; phase rule and phase diagrams

2/4  **Problem set 1 due; class discussion**
2/6  **Midterm Exam 1**
2/8  Crystal chemistry (Ch. 5)
2/11 Crystal chemistry (Ch. 5)
2/13 Igneous rocks and magmas; phase diagrams (Ch. 8)
2/15 Igneous rocks and magmas; melting and crystallization (Ch. 8)
2/18 Igneous rocks and magmas; isotopic studies (Ch. 8)
2/20 Sedimentary rocks and weathering; chemical weathering (Ch. 7, 4, 6)
2/22 Sedimentary rocks & weathering; water chemistry (Ch. 7, 4, 6)
2/25 Metamorphic rocks; variables of metamorphism, reactions (Ch. 9)
2/27 Metamorphic rocks; facies, petrogenetic grid, examples of regional metamorphism (Ch. 9)
3/1  **Problem set 2 due; class discussion**
3/4  **Midterm Exam 2**
3/6  Cosmochemistry; conceptual framework, framework, condensation, molecular cloud chemistry (parts of Ch. 1)
3/8  Cosmochemistry; solar system chemistry, meteorite intro, oxygen isotopes
3/11 Cosmochemistry; meteorites
3/13 **Student presentations**
3/15 **Student presentations**
3/19 **Final Exam** Tuesday, 8:00-9:50. Held in regular classroom.
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ACKNOWLEDGMENT OF SYLLABUS RECEIPT

I have received a copy of the course syllabus for this class, and the instructor has discussed its contents.

NAME (please print)
____________________________________________________
Last                                 First                                           MI

Signature ______________________________________

Date__________________

A phone number where you can be reached: _______________________
And/or an e-mail address:______________________________

Please list your previous geology courses (if any):

Why did you choose to take this particular class?