

SENIOR

SYLLABUS
NORTHWESTERN UNIVERSITY

Senior
NW Environmental
biogeochemistry

Geology 423-C01-0, Section 20
Geochemical Processes in the Earth's Surface Environment

10 Weeks: Wednesdays 12:30-2:00 PM
Fridays, 12:30-2:00 PM

Office hours: Instructor available 0.5 hour before class and
generally 1.0 hour following class.

Instructor

Dr. Gerald J. Kuecher
Office: 311 A
Office Phone: 491-3132
Department Phone: 491-3238
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Important Dates

First day of class: Wednesday, September 25
Midterm Exam: Friday, November 1
Final Projects Delivered: Friday, November 22
Wednesday, November 27
Reading Week: No class December 4 or 6
Final Exam: Wednesday, December 11, 1-2:30 PM

Required Text and other materials (available at Norris)

Butcher, S.S., Charlson, R.J., Orians, G.H., and Wolfe, G.V.,
eds., 1992. Global Biogeochemical Cycles, *Academic Press*,
London, 379 pp.

Supplemental readings as per instructor request

Calculator with log and inverse functions

Basis for Grades

Average of Weekly Quiz/Lab (.250)

Midterm (.250)

Final Project (.250)

Final Exam (.250)

A = 91-100

B = 82-91

C = 73-82

D = 64-73

During this term, you will submit 6 quizzes and 1 lab, and together they will count as 7 quizzes. You are allowed to drop 1 of these quizzes, either due to absence or poor performance. Quizzes will be administered at the close of class each Friday. I will not accept excuses for a second drop.

Quizzes will only cover material from that week's studies and should not be difficult if you pay attention during lecture. The Midterm and Final, however, will be more challenging. Don't get complacent or you will lose!

Required Reading

Sep 25: Chapter 1, Introduction

Sep 27: Chapter 2, Origin and Early Evolution of Earth
Quiz 1

Oct 2: Chapter 3, Evolution and the Biosphere

Oct 4: Chapter 4, Modeling Biogeochemical Cycles
Quiz 2

Oct 9: Chapter 5, Equilibrium, Rate, and Natural Systems

Oct 11: Chapter 6, Tectonic Processes, Freeboard, Denudation
Quiz 3

Oct 16: Chapter 7, Pedosphere

Oct 18: Chapter 8, Sediments and Diagenesis
Quiz 4

Oct 23: Chapter 9, The Oceans
Tour of the Sediments Lab

Oct 25: Chapter 10, The Atmosphere
Quiz 5

Oct 30: Chapter 11, The Carbon Cycle

Nov 1 : Midterm Exam

Nov 6: Chapter 12, The Nitrogen Cycle

Nov 8: Chapter 13, The Sulfur Cycle
Quiz 6

Nov 13: Chapter 14, The Phosphorous Cycle

Nov 15: Chapter 16, Human Modification, Medical Geology
Quiz 7

Nov 20: Chapter 15, Trace Metals
Jean Francois Gaillard presentation 1:15-2:00

Nov 22: Final Projects (1/2)

Nov 27: Final Projects (1/2)

Reading Week

Dec 11: Final Exam 1-2:30 PM

Final Class Projects

You are obligated to submit a written report on a topic of relevance to this class and report to the class on your findings. Your project can consist entirely of library research or it can consist of a combination of lab and library research. In either case, the report must include the basic elements of scientific investigation, i.e. a problem must be identified, a hypothesis is proposed, and these ideas are tested (or challenged).

Laboratory time in the Sediment Geochemistry Lab (Rm 213) can be arranged through the instructor with consent from Dr. Hollander. Lab equipment includes a gas chromatograph, a CO₂ coulometer, centrifuge, hood, water baths, distilled water, an isotope separation system, pH meters, ovens, various core tubes and other capabilities.

Please review the text book for ideas and propose a topic to the instructor by the end of the 3rd week of class. Presentations to the class will be on December 5 and 6. Prepare to finish your data collection about a week in advance to ensure adequate time to write the report. Students should consult the Writing Place for advice on proper design of a technical report. Conclusions at the end of your paper can include areas where future work is needed. The most important thing the instructor wants to see is your approach to research a topic and how critically you have evaluated your topic. I don't expect Nobel Prizes to come from this effort, but I do expect a fundamentally sound effort. A note on your projects limitations and strengths is appropriate in the introduction. Keep a good pace!

A wide spectrum of research is possible. Please concentrate your effort on how global chemical cycles are impacted by your chosen topic.