Environmental Geochemistry GEOL3405 (with lab), 2405 (no lab)_



- Instructor: Dr. Julia Perdrial, Office: 321; Tel: (802) 656 0665; email: Julia.perdrial@uvm.edu
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- Office hours W 9:30-10:30AM and by appointment;
- Meeting Time: Lecture MWF 10:50-11:40; Lab W 2:20 – 5:20PM
- One mandatory full-day field trip on a Saturday in early October
- Credits: 3 (GEOL2405 no lab) or 4 (GEOL3405 with lab), Prerequisite: A Catamount Core N1, N2, or MA course.
- Catamount Core: N1 (no lab), N2 (with lab), OC.

Welcome to Environmental Geochemistry!

Environmental Geochemistry is a (happy) marriage of the fields of geology and chemistry applied on environmental issues.

Lectures (GEOL2405 and 3405): We will use lecture class meeting times to investigate the geochemistry behind important environmental issues. Only once we have an understanding of the complex dynamics behind an environmental issue we can act. We will use a mix of lecture, reading and group work to get to the heart of some of the most pressing environmental issues we face today.

Science communication (GEOL2405 and GEOL3405): scientists need to be good at communicating science to effectively inform the general public on environmental issues such as climate change. We will therefore work on science communication using a variety of hands-on improvisation exercises.

Labs (GEOL 3405 only): You will conduct your own research; we will have one mandatory day-long fieldtrip at the beginning of the semester on a Saturday where you will collect samples for your project. The 1 day-long field trip will count for several lab meeting times, which means that you will have some Wednesday afternoons off. The other times you will spend in an actual environmental biogeochemistry lab (Delehanty 301, please also see the lab syllabus).

Completing this course fulfills the following general education requirements:

N1&2: Natural Science (without or with lab):

1. Demonstrate familiarity with scientific thought, observation, analysis, experimentation, and formal hypothesis testing in relation to the general field or topic of the course.
2. As appropriate to the level and field of the course, make informed judgments about scientific information and arguments related to the natural world.
3. As appropriate to the level and field of the course, use appropriate theories and models to predict change in natural systems over time.

OC: Oral Communication

- Demonstrate oral communication skills including effective presentation; the ability to adapt to audience, setting, and occasion.

- Demonstrate critical thinking and problem-solving skills by discerning, describing and/or adapting to connections between audience, speaker, and occasion.
- Listen effectively and critically evaluate orally presented information and arguments.

General goal of this course:

- At the end of this course you will be able to apply geochemical concepts to explain selected environmental issues (GEOL2405 and GEOL3405).
- You will be able to communicate an environmental issue (GEOL2405) or your lab project (GEOL3405) effectively to a non-science audience.
- You will learn to collect data to test hypotheses on a selected environmental issue. You will also be able to perform selected geochemical analyses in the lab and collect analytical data independently and safely (GEOL3405 only).

Book: Please get a copy of Environmental and Low Temperature Geochemistry (by Peter Ryan), I will provide the first two chapters via blackboard until your copies arrive.

Learning assessment:

Lectures: GEOL2405 and GEOL3405

- You will have the option of choosing between frequent quizzes or two exams (we'll vote at the beginning of the semester). 50%
- You will complete pre-meeting quizzes online. 25%
- Group work and communication. 25%

Labs: GEOL3405 only

- Your group research plan (literature review, hypotheses and materials and methods). 20%
- Your proficiency in the lab, see rubric 2 in the appendix of the lab syllabus). Note that assessment of proficiency in the lab will vary with your academic level. I will take the trajectory of your performance into account, which means that I do not expect a "great" level at the beginning but a clear progress towards it. Note: "great"=A, "solid"=B, "not enough"=C or less in the rubric. 40%
- Your group lab project presentation towards at the end of the semester. As a group you will choose if you will present a poster, a talk or if you generate a short film (see rubrics in the appendix of the lab syllabus). 40%
- The lecture grade will contribute 60% and the lab grade 40% to the total grade for GEOL3405.
- Note: If you are sick and have to miss labs contact me ASAP, please note that most labs cannot be repeated! This is especially true for the fieldtrip.

Schedule (subject to changes):

Week 1:
Lecture: Introduction: What is Geochemistry? Surficial and Environmental Mineralogy.
Science communication: Intro communication (what's the goal, who's the audience)
Week 2:
Lecture: Surficial and Environmental Mineralogy, clays and clay minerals
Lab: Formation of teams, literature review, lab safety trainings
Science communication: Making connection to the audience – jargon vs. emotion
Week 3:
Lecture: Surficial and Environmental Mineralogy, cation exchange capacity
Lab: lab training of specific groups

Science communication: Making connection to the audience – connecting to values
Week 4:
Lecture: Organic compounds in the Environment, structure
Lab: lab training of specific groups
Science communication: Making connection to the audience – being convincing
Week 5:
Lecture: Organic compounds in the Environment, functional groups and behavior
Lab: lab training of specific groups
Science communication: Making connection to the audience – accepting other's ideas in groups (Yes and…)
Week 6:
Lecture: Organic compounds in the Environment, movement and toxicity
Lab: most likely week for fieldwork
Science communication: Making connection to the audience – stories
Week 7:
Lecture: Aqueous systems, redox
Lab: Sample analysis of specific groups
Science communication: Getting specific, prepping for science talks, distilling your message/goal
Week 8:
Lecture: Aqueous systems, solubility, weathering
Lab: Sample analysis of specific groups
Science communication: Practicing with concept sketches
Week 9:
Lecture: Carbon cycle
Lab: Sample analysis of specific groups
Science communication: Practicing with concept sketches
Week 10:
Lecture will be online: Biogeochemical cycles and eutrophication
Lab: finishing up
Week 11:
Lecture: Global atmosphere
Lab: Data and interpretation
Science communication: Practicing with concept sketches
Week 12:
Lecture: Global atmosphere
Lab: Data and interpretation
Science communication: Present your project

Week 13: Thanksgiving recess
Week 14:
Lecture: Stable isotopes and climate
Science communication: Present your project
Week 15:
Lecture: Stable isotopes and climate
Science communication: Present your project
Week 16:
Wrap up

Appendix A: These are the assessment rubrics for exams, problem sets

	Problem sets	
Level of Achievement	**General Approach**	**Comprehension**

Exemplary **100% of points**	• Addresses the question. • States a relevant, justifiable answer. • Presents arguments in a logical order.	• Demonstrates an accurate and complete understanding of the question. • Backs conclusions with data and warrants. • Uses ideas, examples and/or arguments that support the answer.
Adequate **75% of points**	• Does not address the question explicitly, although does so tangentially. • States a relevant and justifiable answer. • Presents arguments in a logical order.	• Demonstrates accurate but only adequate understanding of question because does not back conclusions with warrants and data. • Uses idea to support the answer. • Less thorough than above
Needs Improvement **25-50% of points**	• Does not address the question. • States no relevant answers. • Indicates misconceptions. • Is not clearly or logically organized.	• Does not demonstrate accurate understanding of the question. • Does not provide evidence to support their answer to the question.
No Answer **(0 pts)**		

WHAT'S OK AND WHAT'S NOT OK

ACADEMIC HONESTY AND PLAGIARISM – Academic honesty is expected of all students. The University of Vermont has a very strict policy concerning academic honesty and plagiarism. Please see the statement on academic honesty http://www.uvm.edu/~uvmppg/ppg/student/acadintegrity.pdf. Plagiarism constitutes a violation of Academic Honesty and warrants failure on an assignment and/or failure in the course. The consequences of plagiarism or cheating range from a score of zero on the assignment or exam, to failing the class with an XF and filing a complaint with the University's Coordinator for Academic Honesty which can result in expulsion from UVM.

What's OK: its ok and even expected that you work together and help each other with work in lecture and labs. For individual assignments it is OK to ask a friend, tutor, or group member to help you, however, you have to compile your own work based on this understanding.

What's not OK: Delivering any work without having understood it brings you into a potential danger zone: it is not ok to simply copy an answer, writing or quizzes. Plagiarism includes copying part or all of a fellow student's report, copying from original references, texts, or websites without proper citations etc. You are not allowed to use another person's knowledge during in-class quizzes.

RESPECT – It is of utmost importance to maintain a respectful environment in class and this includes online environments. We expect this from all of you as you should expect this from us. You are here to learn and we are here to help you learn with mutual respect.

What's OK: its OK to arrive late if you have any unforeseeable events. Its OK to miss class for any reason that is out of your control (e.g. sickness) BUT we expect you to make up for it. This means complete all assigned reading, online content and contact your group for additional materials, spend some time with this BEFORE you contact us with questions.

Its OK to disagree with each other and ask for clarification. Its OK to feel frustrated when things don't go well.

What's not OK: It is not OK to disrupt class. It is not OK to expect a private tutoring session from us if you missed class for any reason. Before you contact us or come to office hours you should complete all assigned reading, watching, check in with your group as appropriate and spend some time thinking about the materials. We will be happy to address any remaining issues. It is not OK to blame, shame or insult anybody e.g. when you disagree. It is not OK to work out your frustration on others.

COPYRIGHT ON TEACHING AND CURRICULA MATERIALS – It is the University's policy that teaching and curricular materials (including but not limited to classroom lectures, class notes, exams, handouts, and presentations) are the property of the instructor.
What's OK: you can and will use all class materials for your own learning.
What's not OK: electronic recording and/or transmission of classes or class notes is prohibited without the express written permission of the instructor. Such permission is to be considered unique to the needs of an individual student (e.g. ADA compliance), and not a license for permanent retention or electronic dissemination to others. For more information, please see the UVM policy on Intellectual Property, sections 2.1.3 and 2.4.1. In short, do not share any class materials.

EMAIL – email is an important way of communicating, at the same time it is not uncommon for faculty members to receive more than a 100 emails per day and emails can get lost. Because of this, your primary point of contact will be the GTA, they will check in with me regularly and forward emails as necessary. Please always add the course number to the subject line when you contact your GTA.
What's OK: please contact your TA with any questions on the lecture or lab part that you cannot solve by yourself. The GTA and I will check in on these requests and one of us will answer you within a few business days. If you want an appropriate answer to your particular question it is important to be precise in your wording. Also, please note that we will not be able to answer emails during afterhours or weekends.
What's not OK: please do not contact us with questions you could have googled or ask content questions before you completed the assigned reading/watching. Please don't count on last minute help during afterhours when an assignment is due, you might not get an answer in time. Please use a respectful tone when writing us. For us it is OK to be addressed by our first name but note that this varies by instructor and you should ask if you are unsure. It is not uncommon that GTAs and faculty are addressed with "Yo", "Dude" etc, which is not acceptable.

RELIGIOUS HOLIDAYS – We endorse observation of religious holidays!
What's OK: by the end of the second full week of classes submit in writing your documented religious holiday schedule for the semester to us. Plan ahead and make you're your group knows if you will miss group work. Students who miss work for the purpose of religious observance will be allowed to make up this work. Please avoid informing us post-hoc (after the fact).

OTHER INFORMATION and POLICIES:
In keeping with University policy, any student with a documented disability interested in utilizing ADA accommodations should contact Student Accessibility Services (SAS), the office of Disability Services on campus for students. SAS works with students and faculty in an interactive process to explore reasonable and appropriate accommodations, which are communicated to faculty in an accommodation letter. All students are strongly recommended to discuss with their faculty the accommodations they plan to use in each course. Faculty who receive Letters of Accommodation with Disability Related Flexible accommodations will need to fill out the Disability Related Flexibility Agreement. Any questions from faculty or students on the agreement should be directed to the SAS specialist who is indicated on the letter.

Contact SAS:
A170 Living/Learning Center;
802-656-7753
access@uvm.edu
www.uvm.edu/access

A credit hour is now formally defined, for Title IV aid purposes, as an amount of work that reasonably approximates not less than: (a) one hour of classroom or direct faculty instruction and a minimum of two hours of out of class student work each week for approximately fifteen weeks for a semester or

(b) at least an equivalent amount of work as required in (a) for other academic activities such as laboratory work, internships, practica, studio work, or other academic work leading to the award of credit hours.
This means for the GEOL135/195 lecture part (worth 3 credits) you should expect to **work up to 9 hours** each week.

Code of Student Conduct:
http://www.uvm.edu/policies/student/studentcode.pdf

FERPA Rights Disclosure:
The purpose of this policy is to communicate the rights of students regarding access to, and privacy of their student educational records as provided for in the Family Educational Rights and Privacy Act (FERPA) of 1974.
http://catalogue.uvm.edu/undergraduate/academicinfo/ferparightsdisclosure/

Promoting Health & Safety:
The University of Vermont's number one priority is to support a healthy and safe community:
Center for Health and Wellbeing:
https://www.uvm.edu/health
Counseling & Psychiatry Services (CAPS)
Phone: (802) 656-3340
C.A.R.E. If you are concerned about a UVM community member or are concerned about a specific event, we encourage you to contact the Dean of Students Office (802-656-3380). If you would like to remain anonymous, you can report your concerns online by visiting the Dean of Students website at https://www.uvm.edu/studentaffairs

Alcohol and Cannabis Statement:
The Division of Student Affairs has offered the following statement on alcohol and cannabis use that faculty may choose to include, or modify for inclusion, in their syllabus or Blackboard site:
Statement on Alcohol and Cannabis in the Academic Environment
As a faculty member, I want you to get the most you can out of this course. You play a crucial role in your education and in your readiness to learn and fully engage with the course material. It is important to note that alcohol and cannabis have no place in an academic environment. They can seriously impair your ability to learn and retain information not only in the moment you may be using, but up to 48 hours or more afterwards. In addition, alcohol and cannabis can:

- Cause issues with attention, memory and concentration
- Negatively impact the quality of how information is processed and ultimately stored
- Affect sleep patterns, which interferes with long-term memory formation

It is my expectation that you will do everything you can to optimize your learning and to fully participate in this course.