Fall 2023

General Information

Course Code: ENVS 3220

Course Title: Terrestrial Chemistry

Course Description:
This course surveys the behavior of elements in the Earth's surface environments, encompassing soils and saturated (wetland, lake, river) sediments. The course is focused on understanding the factors that control chemical processes governing soils and freshwater sediments through the reactions of the elements and molecules that they contain. Students will extend their fundamental understanding of chemistry to the materials of the Earth's upper crust.

Credit Weight:
0.5
Academic Department (or campus):
School of Environmental Sciences
Campus:
Guelph
Semester Offering:
Fall 2023
Class Schedule and Location:
Lectures MWF 10:30-11:20
MCKN 119A
We will meet via Teams or Zoom if necessary.

Instructor Information

Instructor Name: Dr. Susan Glasauer
Instructor Email: glasauer@uoguelph.ca
Office hours: by appointment
Office: 321 Alexander

Course Content

Specific Learning Outcomes:

Students will be provided with opportunities to:

1. Understand how biotic and abiotic components of soils and sediments control element chemistry.
2. Select and apply appropriate analytical methods to characterize soil and sediment chemistry.
3. Critically evaluate information pertinent to soil and sediment chemistry presented in scientific, technical and popular formats.
4. Communicate ideas and information pertinent to soil and sediment chemistry and demonstrate accurate use of scientific terminology and notation.
5. Select and apply appropriate quantitative methods to solve problems pertinent to terrestrial chemistry.
6. Understand soil and sediment chemistry in the broader contexts of inorganic chemistry and geochemistry.
7. Apply information that is learned about soil and sediment chemical processes to develop treatment approaches for contaminated soil and sediment.

Lecture Content:

The course will follow the schedule of lectures, assignments and midterms shown on the following page.

Course Schedule 2023

Week	Date	Lect. #	Topic	Reading	Assignments & Exams
1	Sept 8	1	Introduction	Thinking in Systems*, Chapter 1 (The basics)	
2	Sept 11, 13, 15	2-4	Chemical principles applied to Earth systems	Chap. 1, p. 1-13 & 21-31 (skim 13-20) MESS p. 32-27**	Review unit conversions
3	Sept 18, 20, 22	5-7	Chemical principles Soil minerals	Chap. 1, p. 32-40 Chap. 2, p. 1-15 & 15-23	Practice with solid concentrations
4	Sept 25, 27, 29	8-10	Minerals in soil and sediments and some hard facts	Chap. 2 23-40; 45-51	**Assign1 DUE Sept 27**
5	Oct 2, 4, 6	11-13	Soil organic matter: more than muck	Chap. 3, p. 1-12, 12-18, 18-25	
6	Oct 11, 13	14	Mineral-organic interactions: Hard-soft acids&bases	Chap. 3, p. 26-34	**Midterm I October 13**
7	Oct 16, 18, 20	15-17	Organic-mineral interactions Alkali and alk.earth elements: Properties, ionic strength & activity	Chap 3, p. 34-47, 47-50 Chapter 4, 1-26	
8	Oct 23, 25, 27	18-20	Mineral solubility Carbonate chemistry	Chap 4, 27-31 Chap 4, 32-35	**Assign 2 DUE Oct. 27**
9	Oct 30; Nov 1, 3	21-23	Anions Ion exchange reactions	TBD Chap. 5, 1-13	
10	Nov 6, 8, 10	24-26	Salts: Prairie soil & Tar Sands Major soil forming elements: Al, Fe, Si	Chap 5, 15-20 (lightly) Chapter 6 TBD	
11	Nov 13, 15, 17	27-29	Al, Fe, Si (hydrolysis & acidity)	TBD	**Assign 3 DUE Nov. 17**
12	Nov 20, 22, 24	30-31	Remediating acid soil and acid mine tailings	TBD	**Midterm II November 24**
13	Nov 27, 29; Dec 1	32-34	Redox chemistry for water & sediment remediation	Chapter 6, Appendix 2	

The readings and lecture topics may shift or change throughout the semester. The dates for the assignments, midterms and final are fixed, unless we all agree to change them.
All of the reading assignments will be posted on CourseLink under the Readings tab.
*Thinking in Systems, Donella H. Meadows
**MESS = Soil and Water Chemistry by Michael Essington.
TBD=to be determined

The readings and lecture topics may shift or change throughout the semester. The dates for the assignments, midterms and final are fixed, unless we all agree to change them.

Students should be prepared to take notes during class. I will post the notes that I take during lectures on Courselink after class.

Course Assignments and Tests:

Assignment or Test	Due Date	Contribution to Final Mark (%)	Learning Outcomes Assessed
ASSIGN 1	Sept 27	8	1,3,4,5,6
ASSIGN 2	Oct 27	8	1,3,4,5,6
ASSIGN 3	Nov 17	8	1,2,3,4,5,6
Midterm I	Oct. 13	23	1,2,5
Midterm II	Nov. 24	23	1,3,4,5,6
Final	Dec. 6, 8:30-10:30	30	1,2,3,4,5,6,7

Additional Notes (if required):

I will hand out the assignments one week before they are due.

39% of the course mark will be completed before the 40th class day (Nov. 3)

Final examination date and time:
To be determined; I have requested an early date from Scheduling.

Final exam weighting:
30%

The final exam is comprehensive.

Course Resources

Required readings will be posted on the class CourseLink site.
The text is Terrestrial Chemistry (Doner and Glasauer) and it will be posted by chapter throughout the semester, in addition to other required reading. There is no charge for the reading materials.

Other Resources:

Electronic materials from the lectures will be posted on Courselink after the lecture only, at my discretion. The lectures will not be recorded, and students are not allowed to record any part of the course without my permission.

Course Policies

Grading Policies:

Assignments must be handed in on the due dates before 5 pm. You can put electronic copies into the class Dropbox on Courselink, or physical copies into the envelope on my office door.

Policy on Late Assignments: Making up a missed exam or assignment requires a doctor's note or equivalent. Late assignments will be penalized at a rate of 5% markdown per day after the due date.

Copies of out-of-class assignments: Keep paper and/or other reliable electronic back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

Course Policy on Group Work:

Group work will be allowed only where explicitly assigned by the instructor.

Course Policy regarding use of electronic devices and recording of lectures:

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the written permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

I may record and post the lectures, at my discretion. The course textbook is under copyright to Doner and Glasauer and may not be reproduced or distributed without permission.

University Policies

Email Communication
As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

When You Cannot Meet a Course Requirement
When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars. Undergraduate Calendar - Academic Consideration and Appeals https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml Graduate Calendar - Grounds for Academic Consideration https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml Associate Diploma Calendar - Academic Consideration, Appeals and Petitions https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml

Drop Date
Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars. Undergraduate Calendar - Dropping Courses https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml Graduate Calendar - Registration Changes https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-regregchg.shtml Associate Diploma Calendar - Dropping Courses https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml

Copies of Out-of-class Assignments
Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

Accessibility
The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student. When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway. Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability. Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance and not later than the 40th Class Day. For Guelph students, information can be found on the SAS website https://www.uoguelph.ca/sas For Ridgetown students, information can be found on the Ridgetown SAS website https://www.ridgetownc.com/services/accessibilityservices.cfm

Academic Integrity
The University of Guelph is committed to upholding the highest standards of academic integrity, and it is the responsibility of all members of the University community-faculty, staff, and students-to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff, and students have the responsibility of supporting an environment that encourages academic integrity. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or

faculty advisor. Undergraduate Calendar - Academic Misconduct https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08- amisconduct.shtml Graduate Calendar - Academic Misconduct https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

Recording of Materials
Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

Resources
The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs. Academic Calendars https://www.uoguelph.ca/academics/calendars

Disclaimer
Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings and academic schedules. Any such changes will be announced via CourseLink and/or class email. All University-wide decisions will be posted on the COVID-19 website (https://news.uoguelph.ca/2019-novel-coronavirus-information/) and circulated by email.

Illness
The University will not normally require verification of illness (doctor's notes). However, requests for Academic Consideration may still require medical documentation as appropriate.

Additional Course Information

Commitment to the course:
This course is worth 0.5 credits. According to University policy, you should plan on spending up to 12 hours per week engaged with this course, including lectures and seminars. That provides around 9 hours to complete the reading and class assignments and to study the lecture material outside of class meetings. If you have invested this amount of time and still feel like you're struggling to keep up, please make an appointment to see me.

A word about the impacts of the Covid-19 pandemic:
If we have to meet online, the class format will be the same as for in-class lectures. There will inevitably be technology glitches and I appreciate your support as we navigate through these. It's expected that Covid cases will increase in the fall. We will follow university guidelines, but I may request that you wear a mask in class in order to help keep everyone healthy. Isn't it great to not be sick during the semester? 😊