INTRODUCTION TO BIOGEOCHEMISTRY

Winter 2026

General Information

Course Code: ENVS 2310

Course Title: Introduction to Biogeochemistry

Course Description (revised)

> **ENVS*2310 Introduction to Biogeochemistry Winter Only (LEC: 4) [0.50]**
>
> This course explores quantitatively and qualitatively how biological processes control element fluxes between water, air, and earth materials. Students will gain an understanding of the cycles for major elements (C, N, P, S etc.) in Earth's surface environments, including soil, rivers, lakes and oceans. Topics of current interest, such as resource extraction, climate change and geoengineering will be discussed in terms of their contributions to major element cycles. Seminars include quantitation exercises, hands-on exercises, and discussions to complement topics covered in the lectures.
>
> **Prerequisite(s):** BIOL*1070, CHEM*1040, ENVS*2240

Academic Department (or campus): School of Environmental Sciences
Campus: Guelph
Semester Offering: Winter 2026
Class Schedule and Location:
Lectures MW 11:30-12:20 (MCKN 116)
Seminar F 11:30-1:20 (MCKN 029)

All lectures and seminars are in-person only unless otherwise arranged by the instructor or as mandated by university management.

Instructor Information

Instructor Name: Dr. Susan Glasauer
Instructor Email: glasauer@uoguelph.ca

Teaching Assistant: Morgan Nolan
TA email: mnolan04@uoguelph.ca

Office hours

Wednesdays, 4-5 pm, in person (at my office) or via Zoom; also after class on Wednesdays
Please let me know if you would like to meet at a different time or day.

Course Content

Specific Learning Outcomes:

Students will be provided with opportunities to:

1. Understand key scientific concepts in biogeochemistry, with emphasis on the biological control of major and trace element cycling of major elements and select trace elements between terrestrial, aquatic and atmospheric reservoirs.
2. Demonstrate the development of critical thinking and problem solving skills for application in Earth science, as well as in the broader realm of environmental science and biogeochemistry;
3. Understand the benefits and challenges of interdisciplinary science in solving complex environmental issues;
4. Show improved literacy, in particular with respect to comprehension of scientific literature through assigned reading;
5. Demonstrate improved numeracy skills in an environmental Earth science context.

Lecture Content:

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

Students should come to class prepared to take notes. I provide hand-written notes created using the overhead camera during the lectures, but these are not a complete record of the lectures.

I will post course materials on Courselink. This includes the notes that I take during lectures and the seminar, and any other materials such as powerpoint slides and handouts.
The lectures will not be recorded. You may not record the lectures.

Seminars take place on Fridays and reinforce the topics of the course lectures. Work and assignments that aren't completed during the seminar period are due the following Wednesday in class for credit.

Week	Date	Lect#	Topic	Reading	Seminar (Fri)
1	Jan 5	1	Intro to systems science &	BGC *Ch1* **3-16**	Working with models
	Jan 7	2	biogeochemistry	Thinking in Systems Ch 1	
2	Jan 12	3	Earth origins&chemistry	BGC *Ch2* **17-30**	Models&estimation
	Jan 14	4	Evolution of life	BGC *Ch2* **30-44**	DUE 1/21
3	Jan 19	5	The atmosphere: structure,	BGC *Ch3* **51-69**	Residence time DUE
	Jan 21	6	composition & reactions		1/28
4	Jan 26	7	The lithosphere	BGC Ch4 **99-109**	Gaia & feedbacks
	Jan 28	8	Soil reactions	BGC *Ch4* **110-117;126-134**	
5	Feb 2	9	The biosphere	*BGC Ch5* **141-153**	**MIDTERM I 2/6**
	Feb 4	10	The biosphere	BGC *Ch5* **160-174**	***In seminar***
6	Feb 9	11	Biogeochem cycling on land	BCH *Ch6* **183-199**	Stable Isotopes
	Feb 11	12	Biogeochem cycling on land		DUE 2/25
Feb 16-22	**READING WEEK**		**READING WEEK**	**READING WEEK**	
7	Feb 23	13	Biogeochem cycling on land	BGC *Ch6* **199-208**	Finish land cycling
	Feb 25	14	Biogeochem cycling on land	BGC *Ch6* **208-217;224-229**	(Fig. 6.19)
8	Mar 2	15	Wetlands	BGC *Ch7* **249-260;265-277**	Redox balance
	Mar 4	16	Wetlands	BGC Ch7 **288-291**	DUE 3/11
9	Mar 9	17	Intro to freshwater	BGC *Ch8* **293-307**	Reservoirs;
	Mar 11	18	Lakes and ponds	BGC *Ch8* **307-328**	Trophic concepts
10	Mar 16	19	Rivers and streams	BGC *Ch8* **328-342**	Recurrence intervals
	Mar 18	20	Rivers and streams		DUE 3/25
11	Mar 23	21	Estuaries	BGC *Ch9* **342-350**	**MIDTERM II 3/27**
	Mar 25	22	Ocean circulation&comp.	BGC *Ch9* **362-375**	***In seminar***
12	Mar 30	23	Ocean nutrients & productivity	BGC *Ch9* TBD	Oceans
	Apr 1	24		BGC *Ch9* TBD	Monday April 6

Course Assignments and Exams:

Assignment or Test	Due Date	Contribution to Final Mark (%)
Models & estimation	January 21	Best 4 out of 5 marks; each is worth 3%, for a total of 12%.
Residence time	January 28	
Stable isotopes	February 25	
Redox worksheet	March 11	
Recurrence intervals	March 25	
Midterm 1	February 6	25
Midterm 2	March 27	28
Final	April 15	35

Additional information on assignments and exams

Assignments complement the seminar discussions and are due in lecture on the Wednesday that follows the Friday seminar. See the course schedule on the previous page.

Midterms take place during seminar periods. Students may use the entire period (1 hr 50 minutes) to complete the exam.

March 6 is the 40th day of classes. You will have earned 34% of your mark by then.

Final examination date and time: April 15, 11:30-1:30

Final exam weight:
35%

THE FINAL EXAM IS COMPREHENSIVE

Course Resources

Required Text:
Biogeochemistry: An Analysis of Global Change, 4th edition. W. H Schlesinger and E. S. Bernhardt. Academic Press, 2020
Cost: $192.50 at the University Bookstore

The digital version of this textbook is available for free through Ares in the library.

Other Resources:
Additional reading will be posted on Courselink by week (first week only). Electronic materials from the lectures and seminars will be posted on Courselink after the lecture, by week.

Course Policies

Grading Policies:

Assignments include the entire "packet" from the seminar, with responses to all of the questions. This may be handed in at the lecture, put in the envelope on my office door, or scanned and deposited into the appropriate Dropbox on Courselink. It must be turned in by 5 pm on the due date to be considered on time.

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.

Use of AI

The link below provides the most recent statement from U of G for the use of AI in teaching and learning:
https://news.uoguelph.ca/2023/03/university-of-guelph-statement-on-artificial-intelligence-systems-chatgpt-academic-integrity/
In this course, using AI to complete any assessment will be considered cheating. See the statement below on Academic Integrity for the consequences.

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
Any disruption to the normal functioning of the university 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 official websites and circulated by email.

Illness
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 leaves around 8 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 talk to me.

Let's work together to avoid a superspreader event:

We can expect rates of infection to go up during the winter. We can keep ourselves and others from getting sick by wearing masks and sanitizing as necessary. If you are any version of ill, or were exposed to someone who is ill, please consider wearing a mask.

A word about alternate teaching formats:

At times we may be unable to meet in person, because of weather or whatever. In that case I will either provide a Zoom link to students to attend the lecture or I will provide a lecture transcript.