INTRODUCTION TO BIOGEOCHEMISTRY

Fall 2019

General Information

Course Code: ENVS 2310

Course Title: Introduction to Biogeochemistry

Course Description:
This course introduces aspects of Earth science that are critical to understanding environmental issues with societal impacts. Students will gain a basic understanding of biogeochemical cycling by exploring how biological processes control element fluxes between water, air, and earth materials. 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

Credit Weight:
0.5
Academic Department (or campus):
School of Environmental Sciences
Campus:
Guelph
Semester Offering:
Winter 2019
Class Schedule and Location:
Lectures MW 11:30-12:20 ALEX 218
Seminar F 11:30-1:20 ALEX 218

Instructor Information

Instructor Name: Dr. Susan Glasauer
Instructor Email: glasauer@uoguelph.ca
Instructor Phone and Extension: (519) 824-4120 ext. 52453
Office location and office hours: Alexander 321; M 4:30-5:30

Teaching Assistant: Kimber Munford, kmunford@uoguelph.a

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.

Course schedule for lectures, seminars, assignments and midterms:

Week	Date	Class#	Topic	Reading	Seminar
1	Jan 6	1	Earth as a chemical system	BGC *Ch 1* **3-14**	Dealing with uncertainty
	Jan 8	2	Scientific uncertainty	Boan2018; UncertSci	
2	Jan 13	3	Earth origins&chemistry	BGC *Ch 2* **15-28**	Models and estimation - DUE
	Jan 15	4	Evolution of life	BGC *Ch* 2 **31-41**	
3	Jan 20	5	The atmosphere	BGC *Ch* **3 49-63**	Gaia & feedback loops-DUE
	Jan 22	6	Reactions in the atmosphere	BGC *Ch 3* **63-67**	
4	Jan 27	7	The lithosphere	BGC Ch 4 **93-103**	Residence time-DUE
	Jan 29	8	Soil reactions	BGC *Ch 4* **103-111**	
5	Feb 3	9	The biosphere	*BGCCh 5* **135-146;149-150**	Stable isotopes - DUE
	Feb 5	10	The biosphere	BGC *Ch5* **153-161;168-171**	
6	Feb 10	11	Biogeochem cycling on land:	BCH *Ch 6* **195-203**	**MIDTERM I FRIDAY**
	Feb 12	12	C, N, S, P cycling	BGC *Ch 6* **210-217**	
	Reading Week				
7	Feb 24	13	Mass balance	BGC *Ch 6* **217-225**	Redox reactions
	Feb 26	14	Wetlands: defin,, occurrence	BGC *Ch 7* **233-255**	
8	Mar 2	15	Wetland biogeochem	BGC *Ch 7* **259-273**	Wetlands for bioremediation
	Mar 4	16	Wetland biogeochem		
9	Mar 9	17	Intro to freshwater	BGC *Ch 8* **275-288**	Recurrence intervals - DUE
	Mar 11	18	Lakes and ponds	BGC *Ch 8* **288-303**	
10	Mar 16	19	Lakes and ponds	BGC *Ch8* **303-308**	Freshwater – DUE (field trip?)
	Mar 18	20	Rivers and streams	BGC *Ch8* **308-312;317-323**	
11	Mar 23	21	Ocean circulation	BGC *Ch 9* **341-351**	**MIDTERM II FRIDAY**
	Mar 25	22	Ocean productivity	BGC *Ch 9* **352-357**	
12	Mar 31	23	Ocean sediment diagenesis	BGC *Ch 9* **357-365**	Global review
	Apr 1	24	Ocean carbon cycling	BGC *Ch 9* **365-368**	

Students should be prepared to take notes in class by hand. Powerpoint is used on a limited basis to reinforce select lecture material. Electronic devices (laptops, tablets) may be used in class with instructor permission.

I will post scans of the lecture notes from class meetings and any other material, such as powerpoint slides and handouts, on Courselink.

Seminars:
Seminars take place on the Friday of the week and reinforce the topics of the course lectures. Work not completed during the seminar period must be handed in by the Wednesday lecture of the following week.

Course Assignments and Tests:

Assignment or Test	Due Date	Contribution to Final Mark (%)	Learning Outcomes Assessed
Models & estimation	January 22	Best 5 out of 6 marks; each is worth 3%, for a total of 15%.	1,2,3,5
Gaia and feedback	January 29		1,2,5
Residence time	February 5		1,2,5
Stable isotopes	February 12		1,2,3,5
Recurrence intervals	March 18		1,2,3,5
Freshwater	March 20		1,2, 3,4,5
Midterm 1		25	1,2,3,4,5
Midterm 2		25	1,2,3,4,5
Final	April 18	35	1,2,3,4,5

Additional Notes (if required):

Assignments complement the seminar discussions and are due in lecture on the Wednesday that follows the Friday seminar.

Midterms take place during seminar periods. Students may use the entire two hour period to complete them.

Final examination date and time:
April 18, 2:30-4:30. Location TBA.
Final exam weighting:
35%

Course Resources

Required Texts:
Biogeochemistry: An Analysis of Global Change, 3rd edition. W. H Schlesinger and E. S. Bernhardt. Academic Press, 2013

This textbook will NOT be available on library reserve.

Other Resources:
Any additional reading will be posted on Courselink by week. Electronic materials from the lectures and seminars will also be posted on Courselink after the lecture only.

Course Policies

Grading Policies:

Midterms are given during regular class meeting times (lectures and seminars, as described).

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 10% 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:

Electronic recording of classes is expressly forbidden without consent of the instructor. When recordings are allowed, they are solely for the use of the authorized student and may not be reproduced, or transmitted to others, without the express written consent of the instructor.

Phones and laptops are distractions not just for the people using them, but for others sharing the same space. A Canadian study showed that students attempting to multi-task using laptops in the classroom did much worse than peers using pencil and paper to take notes. Even worse, students sitting next to the multi-taskers also suffered significantly ("Students' use of laptops in class lowers grades: Canadian study". Globe and Mail, August 14, 2013).

The use of laptops, tablets and cell phones, including checking messages, is prohibited during class time. Please leave the room if you need to use your phone. Laptops are essential for some students to take notes, but they create a distracting space within the classroom when not used for notetaking. You must discuss your use of an electronic device for taking notes with Dr. Glasauer prior to using it in the classroom.

University Policies

Academic Consideration:

The University of Guelph is committed to supporting students in their learning experiences and responding to their individual needs and is aware that a variety of situations or events beyond the student's control may affect academic performance. Support is provided to accommodate academic needs in the face of personal difficulties or unforeseen events in the form of Academic Consideration.

Information on regulations and procedures for Academic Consideration, Appeals and Petitions, including categories, grounds, timelines and appeals can be found in Section VIII (Undergraduate Degree Regulations and Procedures) of the Undergraduate Calendar.

Academic Misconduct:

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 discourages misconduct. 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.

Detailed information regarding the Academic Misconduct policy is available in Section VIII (Undergraduate Degree Regulations and Procedures) of the Undergraduate Calendar.

Accessibility:

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Student Accessibility Services (SAS), formerly Centre for Students with Disabilities (CSD), as soon as possible.

For more information, contact SAS at 519-824-4120 ext. 56208 or email sas@uoguelph.ca or visit the Student Accessibility Services website (http://www.uoguelph.ca/csd/).

Course Evaluation Information:

End of semester course and instructor evaluations provide students the opportunity to have their comments and opinions used as an important component in the Faculty Tenure and Promotion process, and as valuable feedback to help instructors enhance the quality of their teaching effectiveness and course delivery.

Course evaluations are conducted in class and/or online. Please refer to the Course and Instructor Evaluation Website for more information.

Drop period:

The drop period for single semester courses starts at the beginning of the add period and now extends to the end of the semester, which is listed in Section III (Schedule of Dates) of the Undergraduate Calendar.

Information about Dropping Courses can be found in Section VIII (Undergraduate Degree Regulations and Procedures) of the Undergraduate Calendar.

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 see me.