

University of Colorado Denver
College of Liberal Arts and Sciences
GEOG/ENVS 4010/5010: Landscape Biogeochemistry

Class location: Plaza 114
Instructor: Dr. Kathy Kelsey
Office Hours: Tues 12:30pm – 2:30pm
or by appointment.

Class time: Thurs 2:00pm – 4:45pm
Office: North Classroom 3524
Contact: email in Canvas

Catalog Description: A holistic approach to studying the role chemical elements play in synthesis/decomposition cycles, and the resultant environment from interaction of the lithosphere with the hydrosphere, atmosphere, biosphere, and pedosphere during geological, and ecological timeframes, together with anthropogenic activities. Prereq: GEOG 1202 or GEOL 1072; Introductory college-level physical geography or environmental science course or permission of instructor. Cross-listed with GEOL 4010/ENVS 5010. Max hours: 3 Credits.

Instructor Description: In this course we will explore the microbial and chemical reactions that occur in the atmosphere, biosphere, lithosphere including those that occur on land in in water (freshwater or the ocean), and we will investigate how these processes make up the global biogeochemical cycles through a synthesis exploration of carbon, nitrogen, water, and other elemental cycles. We will use a student-centered learning approach including active learning, student-led discussions and group work. The course is designed this way (1) to improve learning, as research shows student-centered approaches improve learning success; and (2) to allow you to gain professional skills your future employers will value: critical thinking, professional communication via writing and presentation, organization and effectiveness working with collaborators.

Course Goals:

You will gain knowledge of:

1. The important pools and fluxes of water, carbon, nutrients and energy globally that constitute global biogeochemistry.
2. The importance of biogeochemical cycles in understanding and addressing the grand challenges facing humanity and societies (i.e. climate change, feeding a global population, geoengineering)
3. Common methods used in biogeochemical research
4. The role of biogeochemical cycles in supporting human societies, and the effect of human societies on global biogeochemical cycles.

Course Objectives:

You will be able to:

1. Use data and examples from scientific literature to synthesize and address biogeochemical problems
2. Establish and defend connections among different global biogeochemical cycles
3. Locate, interpret, and communicate credible information on biogeochemistry related topics
4. Collaborate in small groups

Required Texts:

Schlesinger, W. H., Bernhardt, E. S., Biogeochemistry; An Analysis of Global Change. (3rd edition). Academic Press; Elsevier; ISBN 978-0-12-385874-0

Additional Materials and Equipment: Additional reading material will be required throughout the semester will be posted on Canvas. To obtain this material, you will need access to a computer with a connection to the internet.

Assessment and Grading:

Overview:

Assignment	Undergrad; GEOG 4010	Grad; ENVS 5010
In-class Assignments	25%	25%
Learning Journal	30% Weekly entries: 60% Reflection: 40%	20% Weekly entries: 60% Reflection: 40%
Graduate Student Pop-up Lecture	--	10%
Tea Bag Experiment	20%	20%
Research Project	25%	25%

In-class Assignments: This is a student-centered course which means that we will do a lot of important work to facilitate your learning in class. One quarter (25%) of your grade will be based on the work that you complete in class, sometimes on your own and sometimes as part of a group. To complete this work and receive credit, it is critical that you attend class. You will not be able to make up in-class assignments unless you have made a prior arrangement with me, or in exceptional circumstances. If you have a legitimate reason why you will be late, will leave early, or cannot attend, you must let me know in advance. If you are too sick to attend class, please let me know as soon as possible, preferably before class begins.

Learning Journals: Research on teaching and learning indicates that reflecting on learning, and relating new concepts to your every-day life, helps facilitate greater learning. Therefore, in this course you will be completing a learning journal entry each week (Jan 30 through April 23), due before class. Your entry will include:

1. **Summary:** ~250 word summary of the reading important points from the reading;
2. **Muddiest Points:** 1 or 2 areas of confusion from the reading (with figure or page number if relevant). If you have no points of confusion, then suggest 1-2 discussion points.
3. **Connections and thoughts:** this is where you can reflect and add your own thoughts! Your entry can include: what about the current topic you find most interesting, how the topic relates what you are learning in another course or something you have observed in your daily life, what strategies you are using to improve your learning in this course and if they are working, etc. Most topics related to the science of this course or your learning process are appropriate. Ask me if you have questions. Your connections and thoughts should be ~250 words (~1/2 page).

Learning Journals (cont): After all of your learning journal entries are completed, the final component of this assignment is to read back through your entries for the semester, and write a reflection on your learning through the semester. Due April 30.

Graduate Student Pop-up Lecture: Each graduate student in this course will be responsible for one pop-up lecture. This will be one ~7-minute lecture that gives the class a “deeper dive” into a topic relevant to the science of Biogeochemistry. The Pop-up Lecture topics will be assigned during the first week of class.

Decomposition Experiment: In this course you will have the opportunity to conduct a small experiment and work with a dataset. This project will be done in small groups. More details will be posted on Canvas. The final assessment for this project will be a short group presentation given to the class on Thurs May 7.

Research Project: Each student will complete an independent research project related to Biogeochemistry. This research project will be on a topic that illustrates the intersection of two biogeochemical cycles. You will complete a project proposal (due March 12) and a final presentation and annotated bibliography (must include ~15 references for undergraduate students and ~20 references for graduate students). The form of your final presentation is optional: you may choose a research paper, a poster, a podcast, a video, an interactive website, or another form if you approve it with me in advance. Each student will present their presentation during our finals period the week of May 11.

Course Schedule and Assignment Due Dates

All assignments are due the day of class at 12pm.

LJ = Learning Journal; BGC = *Biogeochemistry; An Analysis of Global Change*; “Canvas” = additional readings will be posted on Canvas.

Week	Date	Topic	Reading	Assignments due
1	23-Jan	Introduction	BGC: Ch 1	
2	30-Jan	Atmosphere	BGC: Ch 3	LJ entry
3	6-Feb	Decomposition Experiment	BGC: pg 156 – 171; Canvas	LJ entry
4	13-Feb	Lithosphere	BGC: Ch 4; Canvas	LJ entry
5	20-Feb	Biosphere - C cycle	BGC: Ch 5, pg 135 – 156; Canvas	LJ entry; Research Project Proposal
6	27-Feb	Biosphere - Biogeochem Cycles	BGC: Ch 6 selections; Canvas	LJ entry
7	5-Mar	Wetlands	BGC: Ch 7 selections; Canvas	LJ entry
8	12-Mar	Inland Waters	BGC: Ch 8 selections; Canvas	LJ entry
9	19-Mar	Oceans	BGC: Ch 9 selections; Canvas	LJ entry
Spring break				
10	2-Apr	Water Cycle	BGC: Ch 10 selections; Canvas	LJ entry
11	9-Apr	Carbon Cycle	BGC: Ch 11 selections; Canvas	LJ entry
12	16-Apr	N and P Cycles	BGC: Ch 12 selections; Canvas	LJ entry
13	23-Apr	Sulphur and Hg cycles	BGC: Ch 13 selections; Canvas	LJ entry
14	30-Apr	Decomposition Experiment		LJ Reflection
15	7-May	Present tea bag project results		Decomp. Experiment Presentation
Final	14-May	Final Project Presentations		Final Project

Course and Classroom Policies

Grading scale: A: 94-100% A-: 90-93%

B+: 87-89% B: 84-86% B-: 80-83%

C+: 77-79% C: 74-76% C-: 70-73%

D+: 67-69% D: 64-66% D-: 60-63%

F: 0 - 59%

Late Assignments: Late assignments will not be accepted, except in the rarest of circumstances, in which case you should send me an email via Canvas as soon as possible to discuss the situation.

In-class Expectations: Because this is a student-centered course, I expect you to please arrive to class on-time, and stay for the entire period. Please prepare to actively participate by reading the assigned material carefully before class. Out of respect for me and your peers who will often be leading the class, use of cell phones is prohibited, except when in use for a class-related purpose. You may be asked to leave the class if use of your cell phone for other purposes becomes a distraction. Laptop computers are permitted for class related purposes, but not for other activities (email, assignments for another class, etc). Please have all other windows closed. Computer screens can be a big distraction to your peers!

Civility: I am committed to developing and actively protecting an environment in which every individual feels comfortable and respected, and can have their voice heard. It is appropriate to express an opposing view, but please do so with civility. Failure to meet these standards will result in removal from the class. If you have questions or concerns, please let me know.

Communications: I will commonly need to contact you between classes, and I will do so using the email function in Canvas. Please check your email regularly. If you are not receiving emails, or having another issue with Canvas, please let me know. The best way to get your questions for me answered is to come to my office hours. I will also make every effort to answer your inquiries sent through Canvas within two days. If you do not get a response from me within this time, feel free to send a polite follow-up email.

Academic Honesty, Cheating and Conduct: You must complete your work on your own, or with your group in the case of group work, without outside help. Any infractions may result in failure on an assignment or in the class, and/or dismissal from the University. In addition, you must adhere to campus policies in the University of Colorado Denver Student Code of Conduct, which can be downloaded at:

<http://www.ucdenver.edu/life/services/standards/Documents/CUDenver-CodeofConduct.pdf>

Plagiarism: Plagiarism is defined herein as presenting the work of another as your own without proper acknowledgement. The following is considered plagiarism by CU Denver:

- Word-for-word copying of another person's ideas or words (e.g., four consecutive words or more);
- Copying the mosaic of another person's work (e.g., the interspersing of one's own words here and there, while in essence, copying another's work);
- Paraphrasing (e.g., the rewriting of another's work, yet still using their fundamental idea or theory);
- Fabricating or inventing counterfeiting sources;

- Submitting another's work as one's own (e.g., including materials obtained from friends or purchased from the Internet); and
- Neglecting quotation marks on material that is otherwise acknowledged, or overusing quotations. In this course, use quotations only in very rare situations.

If you like the way an author states something, you must shape and synthesize their verbiage into your own thoughts and words. This is your one and only warning: I will not tolerate plagiarism and have tools in place to catch plagiarizers. Plagiarism will lead to failure on an assignment and/or in the class, and will be reported to the CLAS administration who may decide to hand down more stringent penalties. If you are not sure what plagiarism is or how to avoid it, please visit the University of Colorado Denver Writing Center.

Access, Disability, Communication: The University of Colorado Denver is committed to providing reasonable accommodation and access to programs and services to persons with disabilities. Students with disabilities who want academic accommodations must register with Disability Resources and Services (DRS), 177 Arts Building, 303-556-3450, TTY 303- 556-4766, FAX 303-556-2074. I will be happy to provide all approved accommodations, once you provide me with a copy of the DRS letter.

Preferred Names and/or Pronouns: I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records.

Other Items: This syllabus cannot cover all conceivable events or complications that could occur over the course of the semester. In addition to the policies outlined herein, students are expected to adhere to all University policies and state/federal laws and regulations the event that there is no guidance offered in this syllabus for an event or issue that arises in your life, please feel free to contact me and together we will seek a reasonable resolution for everyone involved. These activities may involve consultation with department and University administrators. Additional University policies are attached to this syllabus.

Landscape Biogeochemistry GEOG 4010/ENVS 5010 Learning Objectives

BA Program Learning Goals and Objectives

- 1.2 Explain the distinctive physical characteristics of places and regions in terms of geomorphological, hydrological, climatological, and biogeographical processes.
- 1.4 Analyze, and interpret interconnections between human activities and the natural and built environment at different geographical and temporal scales.
- 1.5 Evaluate the sustainability and resilience of human-environment systems in the past, present, and future.
- 2.2 Apply qualitative and/or quantitative geographic analytical methods (eg laboratory, field, and computational).
- 2.3 Communicate complex geographical information through writing, graphics, presentations, animations, and mapping.
- 2.4 Analyze, and interpret complex problems in research and practice using critical inquiry, systems thinking, synthesis, and interdisciplinary approaches to solve complex problems in research and practice.
- 3.2 Draw on diverse perspectives to examine complex social and environmental issues and practice global citizenship.

- 4.1 Understand key geographical concepts, their multidisciplinary nature, and apply to the real-world.

MS Program Learning Goals and Objectives

- 1.1 Critically evaluate the interdisciplinary nature of environmental science through the integration of the natural and physical sciences along with engineering, extending to the social sciences.
- 1.4 Critically evaluate scientific and causal arguments.
- 2.2 Apply analytic methods, including statistical or geospatial techniques, to environmental data for studying scientific phenomena.
- 2.3 Obtain, analyze and interpret environmental data.
- 3.3 Practice effective communication of environmental science concepts and problems to both scientific and public audiences.
- 4.1 Understand and synthesize complex relationships among components of natural and human systems.
- 4.2 Apply acquired skills to work as an individual or team in environmental research to real-world challenges.

MA Program Learning Goals and Objectives

- 1.1 Demonstrate in-depth knowledge of the theory, methods, and research in the discipline of geography.
- 1.2 Assess the capacity for the discipline of geography to provide a useful and robust forum for exploring, analyzing and responding to developments at the human-environment interface.
- 2.2 Practice obtaining, analyzing, and interpreting complex geographic data.
- 2.1 Apply systems thinking and critical thinking skills to analyze problems and potential solutions in socio-economic-ecological systems at the human-environment interface.
- 4.1 Understand and synthesize complex relationships among components of natural and human systems.
- 4.2 Apply acquired skills to work as an individual and as a team in to address real-world challenges.
- 4.3 Draw on diverse perspectives to examine complex social and environmental issues and practice global citizenship.

**Questions? Ask Lynx Center – ucdenver.edu/lynxcenter
Student Commons 1st floor - 303-315-5969 - lynxcenter@ucdenver.edu**

STUDENT SUPPORT

CARE Team is there for you
Call 303-352-3579 if you
or a classmate needs extra help
Submit a concern at
www.ucdenver.edu/life/services/CARE

Call 911 in case of emergency
Auraria Campus Police: 303-556-5000

CAREER CENTER

ucdenver.edu/careercenter - Tivoli 267
303-315-7315 - careercenter@ucdenver.edu

COUNSELING CENTER

ucdenver.edu/counselingcenter - Tivoli 4th floor
303-315-7270

DISABILITY RESOURCES & SERVICES

ucdenver.edu/disabilityresources - Student Commons 2116
303-315-3510 - disabilityresources@ucdenver.edu

OFFICE OF EQUITY

equity.ucdenver.edu - Lawrence Street Center 12th floor
303-315-2567 – equity@ucdenver.edu

PHOENIX CENTER AT AURARIA

24/7 Free and Confidential Helpline: 303-556-2255
Info on interpersonal violence, referrals, options, & next steps
www.thepca.org - Tivoli 259 - 303-556-6011- info@thepca.org

FREE TUTORING

Contact these services for academic assistance throughout the semester

LEARNING RESOURCES CENTER

ucdenver.edu/lrc - Student Commons 2105
303-315-3531 - tutorialservices@ucdenver.edu

MATH EDUCATION RESOURCE CENTER

MERC Lab North Classroom 4015
math.ucdenver.edu/~mkawai/MERC - 303-315-1712

WRITING CENTER

North Classroom 4014 | Campus Village | Auraria Library
writingcenter.ucdenver.edu

UNDERGRADUATE ACADEMIC ADVISING

ucdenver.edu/undergradadvising

Graduate students: contact your graduate program directly for advising information

ACADEMIC SUCCESS ADVISING CENTER (ASAC)

Student Commons 1113
303-315-1940 - asac@ucdenver.edu

ARCHITECTURE AND PLANNING (CAP)

CU Building 2000
303-315-1000 - cap@ucdenver.edu

ARTS AND MEDIA (CAM)

Arts Building 177
303-315-7400 - camadvising@ucdenver.edu

BUSINESS SCHOOL

15th and Lawrence Street, 4th floor
303-315-8110 – undergrad.advising@ucdenver.edu

EDUCATION AND HUMAN DEVELOPMENT (SEHD)

Lawrence Street Center 701
303-315-6300 - education@ucdenver.edu

ENGINEERING AND APPLIED SCIENCES (CEAS)

North Classroom 2605
303-315-7510 - CEASstudentservices@ucdenver.edu

LIBERAL ARTS AND SCIENCES (CLAS)

North Classroom 1030
303-315-7100 – clas_advising@ucdenver.edu

SCHOOL OF PUBLIC AFFAIRS (SPA)

Lawrence Street Center 525
303-315-2228 - spa@ucdenver.edu

Plan Ahead! Review Important Dates & Deadlines at
ucdenver.edu/registrar >> CU Denver Registrar >> Academic Calendar

MONTH	DAY	DEADLINE	IMPORTANT NOTES
NOVEMBER	1	➤ First day to apply for Spring Graduation via UCDAccess.	
	1-16	➤ Registration begins for Spring Semester via UCDAccess. Check UCDAccess for your specific registration date and time assignment.	❖ For best course selection, register as soon as possible after your registration time assignment.
JANUARY	20	➤ Martin Luther King Jr. Holiday	
	21	➤ First day of Spring semester classes	
	26	➤ Last day to add or WAITLIST classes using UCDAccess. ➤ Last day to request or cancel Grade Forgiveness	❖ Refer to the Grade Forgiveness Form for restrictions.
	27	➤ Last day to drop a class without a \$100 drop charge. ➤ First day to add classes with the Late Add Form with instructor approval	❖ All waitlists will be eliminated today.
FEBRUARY	5	➤ CENSUS DATE – until 5:00 PM. ➤ Last day to DROP full term classes with a financial adjustment.	❖ After this date, dropped classes will appear on your transcript with a grade of 'W'. ❖ After this date, you will be charged the full tuition amount for additional classes added – College Opportunity Fund hours will not be deducted from eligible student's lifetime hours.
		➤ Last day to ADD full term classes with instructor approval on a Late Add Form ➤ Last day to request No Credit or Pass/Fail grade for a class. ➤ Last day to apply for Spring graduation via UCDAccess. After this date, contact your advisor.	
MARCH	23-29	➤ Spring Break	❖ No classes. Campus open.
APRIL	5	➤ Last day to WITHDRAW from a class via UCD Access	
	6	➤ First day to WITHDRAW from a class with a required authority signature on a Late Withdraw Petition Form	
MAY	6	➤ Last day to WITHDRAW from a class with a required authority signature on a Late Withdraw Petition Form	
	11-16	➤ Finals week.	
	16	➤ End of semester – Commencement.	
	21	➤ Final grades available on UCDAccess and transcripts (tentative).	
JUNE	26	➤ Spring degrees posted on UCDAccess and transcripts (tentative).	❖ This is the date your degree will be recorded on your transcript; diplomas begin mailing on July 15th.

➤ [Refer to the Residency website for important deadlines pertaining to In-State Tuition Rate qualification. \(www.ucdenver.edu/residency\)](#)

➤ [Refer to the College Opportunity Fund \(COF\) website for important deadlines pertaining to the COF stipend for eligible undergraduate students paying in-state tuition. \(www.ucdenver.edu/cof\)](#)

Additional Billing/Financial Information: Students are responsible for complying with tuition/fees deadlines. All registered students must access their student account and billing information through UCDAccess. You will also receive an electronic bill to your university email account.

Intensive, module, and off-cycle classes require the same amount of work and number of classroom hours as full-term classes. Intensive classes are less than five weeks. Module classes last five or more weeks, but less than full term. Off-cycle classes vary in length. Module/intensive classes may be added up until the first day of the class. After the first day of class, these classes may be added with the instructor's signature approval and a Schedule Adjustment form is required to drop these classes. Instructor approval is not required to drop the class within the first 15% of class meetings.

Maymester 2020 (tentative)	May 18	Maymester classes begin	
	May 25	Memorial Day Holiday	No classes. Campus Closed.
	June 4	Maymester classes end	
Summer 2020 (tentative)	Jun 8	Summer classes begin	
	July 3	Independence Day Holiday Observed	No classes. Campus Closed.
	Aug 1	End of semester	
Fall 2020 (tentative)	Aug. 17	Classes begin	
	Sept 7	Labor Day Holiday	No classes. Campus Closed
	Nov 23 - Nov 29	Fall Break	No classes. Campus Open
	Nov 26	Thanksgiving Holiday	No classes. Campus Closed
	Dec 12	End of semester - Commencement	