Course Description: This course focuses on biogeochemistry, the study of the chemical interactions between living and non-living components of the environment (soils, atmosphere, water) and how they shape the Earth. Central to the study of biogeochemistry in the modern world is an understanding of how human activities have altered cycles of energy and matter. Biogeochemical cycles are fundamental to all forms of life; understanding the processes and controls at the watershed scale is important to managing environmental problems that can result from altered biogeochemical cycles.

This course will introduce the Earth as a chemical system and its abiotic components. With this background, we will learn about biogeochemical cycling on land, wetlands, and inland waters, with a focus on the watershed scale. Journal articles will be discussed most weeks in addition to textbook chapters, to discuss research findings more deeply. The course will end with a student-led survey of case studies to illustrate general concepts learned earlier in the course.

Sustainability: This course contributes to the study of sustainability by giving students opportunities to connect scientific and ethical dimensions of biogeochemistry with applied aspects like environmental management and policies.

Grade distributions: Participation 10%, Homework 30%, Exam 20%, Presentation 20%, Paper 20%.

Attendance and Participation: (10%) Attendance and active participation are expected, including in problem-solving, discussions in small groups, etc. Missing a class will only be excused with prior notice at the instructor’s discretion.

Readings and Discussions: There are two types of readings in this course: textbook chapters and journal articles (additional materials that support the lecture may be posted in D2L but are not required).

Readings for class discussion (one readings for most class meetings) will be posted in D2L at the beginning of the term. Students must be prepared to discuss the articles and ask/answer questions for each class. Each student must submit 2 questions for discussion relating to each paper by 3PM on the day of class in the appropriate D2L forum. These discussion questions will be counted toward the participation grade.

Discussion of readings is central to this course. All students will actively participate in discussions, with the roles of facilitator, recorder, and participants to be determined for each small group at the start of each class period. For each reading, the recorder in each group will summarize the discussion notes and submit them in the appropriate D2L forum within one week.
Each student will serve as the recorder for 3-4 readings during the term. Students will be graded on their participation and discussion questions. Further details will be posted in D2L.

**Homework:** (30%) HW1 and HW2 will be problem-solving assignments posted in D2L. Assignments are due at the beginning of class on the due date. Late assignments will lose 5% credit each day they are late and will not be accepted 7 days after the original due date. HW3 encompasses the 3-4 summaries posted in D2L by recorders of discussions of assigned journal articles.

**Exam** (20%): The exam will be open-book and open-note, without computers except handheld calculators. Questions may include problem-solving, multiple choice, short answers and/or essays. E-readers (no search functions) will be allowed.

**Presentations:** Student presentations on case studies in watershed biogeochemistry, choosing a research topic addressed in one or more long-term ecological research sites ([http://www.ternet.edu/sites/map](http://www.ternet.edu/sites/map)). These group presentations (2-5 members, 20-50 minutes total) on a biogeochemical topic within the study site(s). Students will sign up for presentation slots and clear their topic with the instructor. Specific instructions will be posted online.

**Final Paper:** Students in 427 will submit an individual 5 page paper that addresses a research question related to their presentation topic. Students in 527 will each submit a more detailed literature review (up to 10 pages) related to their presentation topic. Paper topics must be approved by the instructor in advance. Specific instructions will be posted in D2L.

**Communication:** I am happy to answer questions via e-mail (I rarely check my voicemail), but please allow 24-48 hours for a response, and check the syllabus and handouts first. You are welcome to drop in during my office hours to discuss questions about the course. If you make an appointment to meet at another time, please send me a description of your question by email so that I can be prepared. If you are having difficulties with the course, please come see me early in the term!

**Student Conduct Code:** Portland State has a well-defined conduct code, [http://www.pdx.edu/dos/codeofconduct](http://www.pdx.edu/dos/codeofconduct). Academic honesty is essential. Do not present someone else’s ideas or work as your own without attribution. We will act professionally and respectfully, so please avoid using your computer/phone/tablet for personal reasons during class.

**Special accommodations:** If a student’s personal circumstances are such that he or she needs or develops a need for accommodations, including for medical problems, the instructor must be advised as soon as possible.

**Readings**