GL 9701B: **WETLAND BIOGEOCHEMISTRY**

Prerequisite: Permission of the Instructor

Instructor: Dr. Brian Branfireun, BGS 2064, x. 89221. bbranfir@uwo.ca

Course Outline: Wetlands are key sites of biogeochemical transformations in the watershed. Some of these transformations, such as denitrification, are often considered important ecosystem services of wetlands and can result in improvements of downstream water quality. Others, such as mercury methylation, can threaten food safety and human health. All of these processes are affected by current and future environmental changes in climate and land use. This reading course will explore these topics through directed readings, weekly discussion, and the production of short essays.

Topic Modules:

1) *Low temperature redox biogeochemistry*
A review of the fundamentals of reduction-oxidation reactions that prevail in wetland environments, with a particular focus on anaerobic processes and microbial mediation.

2) *The biogeochemical cycles of N, S, and C in wetlands*
A review of the most studied nutrient reactions in wetlands (nitrogen and sulphur) and the controls on substrate utilization and decomposition (carbon).

3) *Fate and transport of speciating metals in wetlands*
Wetlands (peatlands) are sites of direct and indirect transformation of speciating metals. We will review these processes, with a particular focus on mercury speciation.

4) *Environmental change and wetland biogeochemistry*
Current and future climate and land-use change impacts on wetland biogeochemistry will be explored.

Learning Outcomes: Upon satisfactory participation in class discussion and presentation of assigned materials, and satisfactory completion of assigned work, students enrolled in this course will understand the principles of reduction-oxidation reactions in wetlands, the role of terminal electron acceptors and donors in these reactions, and environmental limiting factors on these processes. In meeting the above criteria, students will also have the opportunity to improve their ability to conduct research of the primary literature, and through extensive feedback and discussion, improve the focus and clarity of their scientific writing.

Assessment: Four short papers corresponding to the four topic modules will be assigned. These papers will be focused on the topic area, be expected to draw on foundational and current literature, and demonstrate aptitude in research and writing. Each paper will be worth 20% of the final grade (80% total), and subjected to a criterion-based assessment. The final 20% will be based on participation in the discussion and weekly presentation of assigned readings.

Meetings

12 meetings will be held over the academic term.

Week 1: Introduction to Wetland Biogeochemistry
Week 2: Low temperature redox biogeochemistry (I):
Week 3: Low temperature redox biogeochemistry (II):
Week 4: The biogeochemical cycles of N, S, and C in wetlands (I). Module 1 paper due.
Week 5: The biogeochemical cycles of N, S, and C in wetlands (II).
Week 6: Fate and transport of speciating metals in wetlands (I). Module 2 paper due.
Week 7: Fate and transport of speciating metals in wetlands (II)
Week 8: Environmental change and wetland biogeochemistry (I). Module 3 paper due.
Week 9: Environmental change and wetland biogeochemistry (II)
Week 10: Wrap up and Module 4 paper due.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_grad.pdf