GEOG 470 Wetlands fall 2014 Tentative Course Outline

Instructor: Prof. Gail Chmura, Room 628, Burnside Hall, 926-6854, gail.chmura@mcgill.ca office hours by appointment

Lectures Tuesday 11:35-13:25 hr, room 308 Burnside Hall (BH)

Labs Thursday 9 – 11, BH 5th floor electronic classroom, except for 2 labs immediately following our field trip when we will be processing samples in BH 615. I hope to have lab instructions distributed in class prior to the scheduled lab activity. LABS THAT ARE NOT IN THE GIC WILL **TAKE AN ADDITIONAL HOUR**. (WE ARE NOT ALLOWED TO BOOK 3 HOURS IN THE GIC, SO COMPLETION OF THOSE LABS MAY REQUIRE WORK OUTSIDE OF THE SCHEDULED LAB TIME.

Required Field trip:
We will take a three day field trip (Sept 19-21) to wetlands along the St. Lawrence River. Students will be responsible for costs of meals, cost of housing and partial cost of transportation. You will need rubber boots (calf height) and rain gear that you are willing to get muddy.

Prerequisites: Permission of instructor. Students should have completed other courses in natural science at the 300 level. A course in ecology or biogeography will be particularly helpful.

Course outcomes

1. An appreciation of the biophysical structure of wetlands, the major ecological processes that occur in wetlands and the environmental factors that control the structure and function of wetland systems
2. A wetland vocabulary (understanding of terms for wetlands and their vegetation)
3. Ability to organize and present scientific data
4. Familiarity with statistical techniques useful for analyzing environmental data (regression, classification and ordination methods)
5. Knowledge of critical ecosystem functions and services of wetlands
6. Knowledge of anthropogenic impacts (climate change, nutrient enrichment, invasives) on wetlands

Calendar description:
An examination of the structure, function and utility of wetlands. Topics include the fluxes of energy and water, wetland biogeochemistry, plant ecology in freshwater and coastal wetlands and wetlands use, conservation and restoration. Field trip(s) are envisaged to illustrate issues covered in class.

Evaluation:
Rather than test your ability to recall information and compose thoughtful prose in a sleep-deprived state, you will be evaluated on your knowledge of the course material through a series of assignments. These assignments will require you to apply material from lectures and readings as you assess data from the field trip and labs, or the primary literature. (Lecture topics are followed by A# to indicate the relevant assignment.) By their nature, there can be no set rubric for grading the assignments. To obtain a "B" grade it should be clear from your writing that you have covered and understand the assigned material as well as the science it is based upon. If you make a statement that contradicts your readings you must recognize that apparent contradiction and explain your position. You also must follow instructions. For example, if you are asked to critique a model or hypothesis presented in a paper, you must be able to recognize these aspects and not simply consider a related detail. "A" grades will be awarded to those papers that demonstrate insight and creativity. To receive top grades you also must write clear, direct prose with good grammar. You will receive critiques of these aspects of your writing using Word's track changes and expectations of good writing will increase over the semester.
The research you do for assignments is original and the whole class can benefit from what you have learned. Thus, each student will prepare a 3-minute oral presentation (limited to 3 PowerPoint slides) for Assignments 2 – 5. These will not be graded, but do provide a chance to get feedback on your assignment before it is submitted for grading.

Assignment 1	Classification and values of wetlands visited on field trip written product due date	10% Sept 25
Assignment 2	Assess the nature of wetland succession as reflected in the paleoecological record reported in the primary literature class presentations written product due date	10% Sept 30 Oct 2
Assignment 3	Critique Zedler's invasive model with recent examples from the primary literature	10%

	class presentations written product due date	Oct 7 Oct 9
Assignment 4	Critique flood-pulse concept with recent examples from the primary literature class presentations written product due date	10% Oct 28 Oct 30
Assignment 5	Update of textbook chapter on a type of wetland written proposal due class presentations written product due date	20% Oct 14 Nov 11 Nov 13
Assignment 6	Diversity of wetlands & its controls (this is an original analysis and report of data collected in the field and laboratory – no oral presentation) 1st draft Final version due	30% Nov 20 Dec 2
	Class and lab participation (you are allowed to miss 1 lab and 1 lecture before you lose the 5%)	10%

Readings

Copies of the two texts will be on reserve at the Humanities and Social Sciences Library.

Mitsch, W.J. and Gosselink, J.G. 2007. *Wetlands, fourth edition*. John Wiley & Sons, Inc. ISBN: 978-0-471-69967-5

Mitsch, W.J., Gosselink, J.G., Zhang, L., and Anderson, C.J. 2009. *Wetland Ecosystems*. John Wiley & Sons, Inc. ISBN: 978-0-470-28630-2

The second text is essential for Assignment 5. Many wetland-specific chapters may help you in other assignments, as well.

Additional publications are assigned (see attached) for many topics. Some will be downloadable from mycourses, some distributed in class and others can be obtained through the McGill Library.

Tentative lecture topics and readings see announcements in class for updates "Chapters" refers to Mitsch & Gosselink text, additional papers may be assigned

The quagmire of wetland plant forms, wetland types and classification (A1)

- Chapters 2 Wetland Definitions and 8 Wetland Classification
- Cowardin, LM, Carter, V, Golet, FC, & LaRoe, ET. 1979. Classification of Wetlands and Deepwater Habitats of the United States. FWS/OBS-79/31, U.S. Fish and Wildlife Service, Washington, D.C. 103 pp. (pdf available on mycourses)
- Golet, FC. 1996. Life Forms of Wetland and Deepwater Plants of the Northeastern United States. Pgs 1-4 In Wetland Ecology Lab Manual for use in NRS 423, University of Rhode Island. (pdf available on mycourses)
- Warner, BG & Rubec, CDA. 1997. The Canadian Wetland Classification System, second edition. National Wetlands Working Group, Wetlands Research Centre, University of Waterloo, Ontario. (pdf available on mycourses)

Ecological services of wetlands (including uses and management (A1)

- Chapter 1 Wetlands: Human History, Use and Science;
- Chapter 11 Values and Valuation of Wetlands
- Costanza, R. and others. 1997. The value of the world's ecosystem services and natural capital. Nature 387:253-260.
- Paul M. Mayer, P.M., S.K. Reynolds, Jr., M.D. McCutchen, and T.J. Canfield. 2007. Meta-analysis of nitrogen removal in riparian buffers. Journal of Environmental Quality 36:1172–1180.

Special adaptations of organisms to wetland conditions (field trip, A5, 6)

- Chapter 6 Biological Adaptations to the Wetland Environment

Hydrology - why do wetlands exist? - Tides, floods, and *Sphagnum* (A5)

- Chapter 4 Wetland Hydrology

Wetland succession – myths, historical baggage and evidence from paleoecological studies (A2)

- Chapter 7 Wetland Ecosystem Development
- Excerpts from writings of Clements and Gleason – download from mycourses
- Hughes, P.D.M, & Dumayne-Peaty, L. (2002). Testing theories of mire development using multiple successions at Crymlyn Bog, West Glamorgan, South Wales, UK. *Journal of Ecology* 90:456-471.
- Written "dialog" with Hughes – download from mycourses
- Wetland terms and definitions – download from mycourses

What makes flooded soils special? Wetland soil chemistry and redox potential (A5, 6)

- Chapter 5 Wetland biogeochemistry

What is a propagule?- climate warming and problems of upstream migration! (A5, 6)

- See PowerPoint on mycourses.
- Green, AJ, Figuerola, J & Sanchez, MI. (2002). Implications of waterbird ecology for the dispersal of aquatic organisms. Acta Oecologia 23:177-189.
- Middleton, B. 2000. Hydrochory, seed banks, and regeneration dynamics along the landscape boundaries of a forested wetland. *Plant Ecology* 146:169-184.

What controls diversity of wetlands? Environment, stress and competition (A6)

- Keddy, P.A. 2000. Chapter 3 Diversity. In: Keddy, P.A. (Ed.), *Wetland Ecology* (pp. 124-176). Cambridge: Cambridge University Press.
- Virtanen, R, Muotka, T, & Saksa, M. (2001). Species richness-standing crop relationship in stream bryophyte communities: patterns across multiple scales. *Journal of Ecology* 89:14-20.

Invasive species (A3)

- Zedler, JB & Kercher, S. 2004. Causes and Consequences of Invasive Plants in Wetlands: Opportunities, Opportunists, and Outcomes. *Critical Reviews in Plant Sciences* 23(5):431–452.
- Lavoie, C, Jean, M, Delisle, F & Letourneau, G. 2003. Exotic plant species of the St Lawrence River wetlands: a spatial and historical analysis. *Journal of Biogeography* 30:537–549.

Pulse-flood concept (A4)

- Junk, WJ & Wantzen, KM. 2006. Chapter 11 Flood pulsing and the development and maintenance of biodiversity in floodplains. Pp. 407-435 IN Baltzer, D.P. and Sharitz, R.R. (eds.) Ecology of freshwater and estuarine wetlands. University of California Press, Berkeley.

Global change, sea level rise, hurricanes and tidal wetland sustainability

- Chapter 7 Wetland Ecosystem Development and Chapter 10 Climate Change and Wetlands
- Torio D & Chmura, GL. in press. Assessing Coastal Squeeze of Tidal Wetlands. *Journal of Coastal Research*.
- Cahoon, DR, Hensel, P, Rybczyk, J, McKee, KL, Profitt, CE & Perez, BC. 2003. Mass tree mortality leads to mangrove peat collapse at Bay Islands, Honduras after Hurricane Mitch. *Journal of Ecology* 91:1093.
- McKee, KL, Cahoon, DR & Feller, IC. 2007. Caribbean mangroves adjust to rising sea level through biotic controls on change in soil elevation. *Global Ecology and Biogeography* 16:545-556.

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- *McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see* ***www.mcgill.ca/students/srr/honest/*** *for more information).* ***Much of the graded material in this course is prepared using data collected as a group. You may discuss the veracity of this data with class members, but all thoughts expressed in your written products must be your own or properly referenced – see journal articles for examples.***
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