

AQUATIC ECOLOGY OF THE TROPICS

EEES 4980-004/6980-002 -- Spring 2015 - 3 credits

Time and Place: Monday, Wednesday 11:00am – 12:15 pm; Bowman-Oddy 1014
Instructor: Dr. Johan F. Gottgens, 3007B BO, 530-8451 (office) or 4597 (lab)
E-mail: johan.gottgens@utoledo.edu
Office hours: Tuesday, Wednesday 1:30-4:00pm, or by appointment.
Prerequisite: One semester of ecology or consent of instructor.

Description:

Structure, functioning, and management of freshwater ecosystems in the tropics in contrast with temperate zone systems. The course focuses on ecological concepts needed to understand and solve practical management problems involving water pollution, wetlands, dams and reservoirs, habitat restoration, watershed management, and conservation of biodiversity. Professional applications for careers in 3rd world environmental management and conservation of aquatic resources (e.g., Peace Corps, United Nations, Rockefeller Foundation, World Bank, World Wildlife Fund, The Nature Conservancy, etc.) will be emphasized.

Student Learning Outcomes:

Following successful completion of this course, students will be able to:

1. Articulate environmental features associated with tropical aquatic systems at lower latitudes.
2. Illustrate the controlling mechanisms of biological production in tropical lakes.
3. Utilize critical thinking and communication in analyzing current (or past) environmental management problems of a selected tropical aquatic system.
4. Describe major differences between tropical and temperate zone aquatic ecology.
5. Evaluate selected literature for relevance to the management of tropical systems.

Course web site:

Access through Blackboard. The course web site will provide links to all lecture presentations, readings, summaries of important concepts, recent news articles, web explorations, information about jobs/internships, and more.

Text:

Required: A collection of general review papers and primary literature pertaining to management, conservation, and restoration of lakes, rivers and wetlands in tropical regions. All readings will be available on Blackboard.

Some recommended texts (if needed, you can borrow my copies from time to time):

- Osborne, P.L. 2012. *Tropical ecosystems and ecological concepts* (2nd edition). Cambridge University Press: 522 pp. [general tropical ecology]
- Payne, A.I. 1986. *The Ecology of Tropical Lakes and Rivers*. Wiley & Sons, U.K.: 301 pp. [focused on African lakes]
- Kricher, J.C. 1997. *A Neotropical Companion: An Introduction to the Animals, Plants, and Ecosystems of the New World Tropics*. 2nd Ed., Princeton University Press: 389 pp. [general neotropical reading]
- Talling, J.F. and J. Lemoalle. 1998. *Ecological dynamics of tropical inland waters*. Cambridge University Press: 452 pp. [tough to digest]

Requirements and evaluation:

Grades will be based on participation (5%), two midterms (each 25%), a presentation/fact sheet (20%), and a final (25%). All exams have an open book/open notes format and will stress interpretation (recognizing relationships within some body of information) and extrapolation

(extending what you have learned in class to determine its implications or consequences). Exams for the graduate students (EEES 6980) will be different and include questions that focus on synthesis (creating something new out of what you already know). All material for the exams will come from the lectures and assigned readings.

Grade distributions for the midterms and the final exam may be curved. The grading scale is A (91% and above), B (81-90%), C (71-80%), D (61-70%) and F (60% and below). "+" and "-" grades are given at the fringes of these categories. In other words, an A- is given for grades between 90 and 91% and a B+ is assigned for grades between 89 and 90%, etc. Keep track of the last day to withdraw from the course and receive a "W" grade. Unless a student withdraws him/herself by this date, he/she will remain enrolled in the class and will be graded. "IN" grades are only given in extraordinary cases when unexpected conditions prevent the student from completing the requirements of the course within the term of enrollment.

Oral presentation and Fact sheet:

Early in the semester, each student will also select his/her favorite tropical aquatic system (lake, wetland, reservoir, or river) and prepare a 15-minute oral presentation and a fact sheet on this ecosystem. These presentations will be concentrated after the spring break and you will have a chance to sign up for a preferred time slot. You can use Powerpoint, transparencies, slides, chalk, or anything else you want to bring in (as long as it's dead, caged, or on a solid leash). The goal is to improve important skills needed for communicating essential information on a topic of general interest to a diverse audience using the two most common formats (e.g., a short oral presentation and a brief written summary). Your presentation plus fact sheet counts for 20% of your final course grade. The presentations should follow the following format:

1. State the objective of your talk and introduce the particular aquatic system (in terms of location, morphometry, water quality, mixing regime, plant/animal communities, etc.). Make sure that you define the concepts you will use in your presentation.
2. Highlight and discuss one recent (>2000) research publication about this ecosystem. Present relevant data, facts, and/or trends reported in this publication.
3. Review a current (or a past) management problem or conflict involving this ecosystem. If there are no controversies, you should conclude by identifying gaps in our understanding of this ecosystem.

The fact sheet (due one week before the scheduled presentation) should be limited to one page (single-spaced, using summaries and bullet statements) and serve as a written outline of your presentation. Make sure you list the references you used for the development of this fact sheet.

Academic Honesty:

Students are expected to strictly adhere to principles of academic honesty in all aspects of this course, in accordance with policies presented in The Student Handbook and at <http://www.utoledo.edu/dl/students/dishonesty.html>.

University Policies:

The University is an equal opportunity educational institution. Please read the policy statement on non-discrimination on the basis of disability - Americans with Disabilities Act compliance available at www.utoledo.edu/policies/administration/diversity/pdfs/3364_50_03_Nondiscrimination_o.pdf.

In addition, the University of Toledo is committed to providing equal access to education for all students. If you have a documented disability or you believe you have a disability and would like information regarding academic accommodations/adjustments in this course please contact the Student Disability Services Office (<http://www.utoledo.edu/offices/student-disability-services/>).

*J.F. Gottgens: Aquatic Ecology of the Tropics – Spring 2015 (EEES 4980/6980)**

Week	Date	Topics	Readings**
1	Jan 12, 14	Introduction. The Pantanal of Brazil; why study tropical freshwater ecosystems? History/overview of tropical freshwater ecology. Career opportunities.	Gottgens <i>et al.</i> 2001
2	Jan 21	Environmental features influenced by tropical latitude: Geodynamics, climate, hydrology. Formation of lakes, estuaries and wetlands.	Osborne 2012 (Ch. 1)
3	Jan 26, 28	Morphometry, zonation. Energy balance, drainage basins, water budgets. Physical/chemical processes.	Mitsch <i>et al.</i> 2010
4	Feb 2, 4	Circulation patterns and their impacts in crater lakes, high-altitude lakes, shallow and deep large lakes. Water chemistry, chemical stratification, and human impact.	
5	Feb 9	First Midterm	
5	Feb 11	Resource utilization, biological production, light penetration, depth profiles of photosynthesis.	
6	Feb 16, 18	Nutrient uptake, dissolved/particulate organic carbon, biological production and seasonality. Production-biomass ratios, community production, fish yields.	
7	Feb 23, 25	Microbiology, dynamics of organic matter processing. Microbial loop. Parasitology; challenges in managing water-borne diseases.	Sattenspiel 2000
8	Mar 2, 4	Lake Victoria; Watershed disturbance, hypolimnetic anoxia, fish introductions, and extinction of endemics (example of fact sheet/presentation)	Hecky <i>et al.</i> 1994
9	Mar 9-13	<i>Spring Break</i>	
10	Mar 16	Second Midterm	
10	Mar 18	Phytoplankton, macrophytes. Ecology of major groups, diversity, seasonal succession.	Lewis 1990
11	Mar 23, 25	Zooplankton, zoobenthos. Ecology of major groups, diversity. Trophic cascades. Microbial loop revisited.	Infante & Riehl 1984
12	Mar 30 Apr 1	Fish, air-breathing vertebrates. Ecology, adaptations, diversity. Exotics, endemics, and extinctions.	Nilssen 1984
13	Apr 6, 8	Tropical food webs: Detrital, aquatic-terrestrial, plankton, double food chains, short food chains, etc.	Schiemer 1996
14	Apr 13, 15	Flood pulse, pulse stability, and aquatic-terrestrial transition zones. Highland tropical habitats, the 'other' tropics.	Junk 1996
15	Apr 20, 22	Management and restoration issues. Exotic introductions. The legacy and future of tropical limnology	Crisman and Streever 1996
16	Apr 27, 29	The Everglades: North America's subtropical wetland.	Richardson 2010
Final Exam (<i>Open book/notes format and thus flexible date/time. Officially scheduled for 10:15 - 12:15pm on May 8</i>)			

* *Note that the exact pace of lectures is approximate; however, the schedule for midterms and exams will not change.*

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