

FW879: Advanced Limnology-Spring 2010

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Lecture notes: PDF files of lecture notes will be posted on Angel by the DAY OF lecture. Please download, print and bring to class.

Class times: M,W: 3-4:20; 183 Chemistry Bldg.

Course packet: None, PDF files of all readings will be made available on the course Angel website.

Course description: Limnology is a broad sub-discipline of ecology that is the study of the structural and functional interrelationships of organisms of inland waters as they are affected by their dynamic physical, chemical and biotic environments (Wetzel 2001). In this course, we will examine the dominant organizing principles and the current conceptual advances in the field of limnology focusing on lakes. We will explore major themes in limnology that include: nutrient limitation of primary production, nutrient and foodweb paradigms, stoichiometry, benthic vs pelagic ecology of lakes, lake heterotrophy, and human stressors on freshwater ecosystems.

Course format: The course will consist of a combination of lecture, class discussions, and student presentations.

Course learning objectives:

1. To have a foundation in the basic functioning of the physical and chemical environment of lake ecosystems as these basic concepts apply to most advanced topics in limnology.

Course activity: INTRODUCTORY LIMNOLOGY LECTURE

2. To understand the major conceptual ideas in the study of freshwater ecosystems, focusing on lakes.

Course activity: LECTURE, READINGS, MIDTERM EXAM, CLASSROOM DISCUSSION, FINAL SYNTHESIS WRITING ASSIGNMENT

3. To understand the major approaches and techniques used to study freshwater ecosystems.

Course activity: STUDENT PRESENTATION

4. To deepen your understanding of (2) through discussion with a wide range of viewpoints.

Course activity: CLASSROOM DISCUSSION

5. To develop the skills needed to effectively discuss and evaluate the scientific literature.

Course activity: CLASSROOM DISCUSSION REFLECTION ASSIGNMENT, DISCUSSION PARTICIPATION

Grades: Your grade will be based on your cumulative performance in all of the above activities:

<u>Total (%)</u>	<u>Grade</u>
90-100	4.0
85-89	3.5
80-84	3.0
75-79	2.5
70-74	2.0
65-69	1.5
60-64	1.0
<u>< 60</u>	<u>0.0</u>

Course assessment: You will be assessed in a variety of different ways that are aligned with the course objectives (see above).

Introductory Limnology Lecture (written only) -- 15%

DESCRIPTION: You will prepare a lecture for an undergraduate limnology course on a given topic. You will not 'present' the lecture, rather you will prepare the Powerpoint presentation and write the text for the slides in the 'notes' feature of Powerpoint and turn that into me as a Powerpoint presentation. This assignment has two primary goals: (1) to prepare you for a later assignment where you will give a presentation to this class; and (2) to help you review basic limnological concepts.

Participation in discussions* (readings) -- 30%

DESCRIPTION: One of the more important purposes of discussions is the analysis of a specific idea/concept/article for improved understanding. Having students go through this process as a group is an effective way to more fully explore material than doing so on your own. You will be responsible for participation in every discussion period. You will turn in a short written reflection piece at the end of each discussion period that evaluates your own discussion contributions as well as the discussion as a whole. You will be provided specific guidelines about how to best participate in and facilitate a class discussion.

Midterm Exam 20%

DESCRIPTION: There will be only one exam in this course. It will serve as a way to ensure that you have a solid understanding of the important underlying limnological concepts. The exam will be a mix of: short answer, multiple choice, graph interpretation, short essay, and will be closed book.

Student Presentation -- 25%

DESCRIPTION: You and 1 other classmate will work together to give a presentation to the class in the form of a guest lecture on a specific topic. The presentations will occur at the end of the semester.

Short synthesis writing assignment – 10%

DESCRIPTION: You will be asked to synthesize material from the class in answer to several questions that will be due on the second day of finals at 5pm. The questions will pertain to material in the final portion of the class, student presentations, discussions, and overall course themes.

**Note that your 'participation' as a discussant will not be graded! Details provided soon.*

Course readings: The reading material for the course is taken from the primary literature. Almost all lectures will have 1-2 papers to read prior to the class period. For some lectures I include background reading that you should 'skim'. Typically, these are well-known and well-cited older literature that you should be aware of and have read.

Useful textbooks: Although there are no textbooks in this class, there are several limnology textbooks that I would recommend using as a reference for this class. As a general overview reference, I often use the Kalff book, and would recommend buying that. For lots of detail, it is nice to have the Wetzel one as well as a reference, but it is dense and not easy reading. The 5 books listed below will be made available in the FW grad mailroom to check out for ½ day or overnight.

Kalff, J. 2002. *Limnology – although this is at an introductory level, it has good overview material. Good place to start.*

Wetzel, R.G.. 2001. *Limnology: Lake and river ecosystems – this is more like a reference book – has LOTS of detailed information, not as much good overview. So, good to use if you are looking for detail – be sure to get the newest edition (2001).*

Dodson, S.. 2005. *Introduction to limnology – this is very introductory, and written a little different, but good overview.*

Bronmark, C. and L.-A. Hansson. 2005. *The Biology of Lakes and Ponds – this is very introductory and focuses on biology, but very well written and good overview.*

Dodds, W.K.. 2002. *Freshwater ecology: concepts and environmental applications – this is written more broadly, but has some good content as well.*

Lecture topics and assignments for FW879 – 2010

Date	General topic	Specific topic	Assignments
Jan 11	Introduction	1 Course Introduction and pre-test	
Jan 13	Introduction	2 Limnology review	
Jan 18	<i>No class</i>	<i>MLK day</i>	
Jan 20	Introduction	3 Organizing paradigms –nutrient and foodweb paradigms, trophic cascades	
Jan 25	Presentations	4 DISCUSSION/ACTIVITY – student presentations	
Jan 27	Nutrients	5 Nutrient limitation of phytoplankton	
Feb 1	Nutrients	6 DISCUSSION	Introductory limnology lecture due Feb 1, 5pm
Feb 3	Nutrients & Foodwebs	7 Trophic cascades and foodweb interactions	
Feb 8	Nutrients & Foodwebs	8 Stoichiometry	
Feb 10	Nutrients & Foodwebs	9 DISCUSSION	Turn in presentation topic choices
Feb 15	Carbon dynamics	10 Dissolved organic carbon in lakes	<i>Presentation topics assigned</i>
Feb 17	Carbon dynamics	11 Heterotrophy in lakes	
Feb 22	Carbon dynamics	12 DISCUSSION	
Feb 24	Special Topics - Invasive spp	13 Nutrient mediated effects of zebra mussels on toxic algae - Geoff Horst	
Mar 1 *	Presentations	14 Student presentation brainstorming session	Turn in outline as a result of day's work
Mar 3 *	Special Topics - Invasive spp	15 Rapid evolution of invasive species - Andrea Jaeger Miehl	
Mar 8	--	<i>Spring break</i>	
Mar 10	--	<i>Spring break</i>	
Mar 15 *	Presentations	16 Student presentation brainstorming session	Turn in PPT outline with list of ref's.
Mar 17 *	Exam review	17 Review period – review practice exam as a class	Come to class having taken the practice exam
Mar 22	--	18 EXAM (<i>you will have 2 hrs available if you choose</i>)	EXAM
Mar 24	<i>Benthic perspective</i>	19 <i>Ecology of littoral zones</i>	
Mar 29	<i>Benthic perspective</i>	20 <i>Benthic dominated lakes (i.e. Shallow lakes)</i>	Presentation 1 - PPT due
Mar 31	<i>Human stressors</i>	21 <i>Acid deposition effects on freshwaters</i>	Presentation 2 - PPT due

Apr 5	<i>Human stressors</i>	22 <i>DISCUSSION – Multiple human stressors</i>	
Apr 7	Approaches in limnology	23 DEBATE/DISCUSSION – <i>Prediction vs understanding in limnology</i>	Presentation 3 - PPT due
Apr 12	Approaches in limnology	24 Student presentation – Paleolimnology – Cory/Kim	Presentation 4 - PPT due
Apr 14	Approaches in limnology	25 Student presentation – Modeling – Dianna/Stacie	Presentation 5 - PPT due
Apr 19	Synthesis	26 Linkages among freshwater ecosystems – NEW LECTURE	
Apr 21	Approaches in limnology	27 Student presentation – Whole lake experiments – Heidi/Jeff/Kyle	
Apr 26	Approaches in limnology	28 Student presentation – Stable isotopes – Nick/Eric	
Apr 28	Approaches in limnology	29 Student presentation – Genetics – Jan/Beth	
May 4	Final assignment	Turn in assignment # 3	Turn in assignment # 3

* Dates that I will be out of town, but you will be expected to attend class, or work together with your presentation partner.