SPEA-E455 – Limnology (Fall 2010)

Location & Time: Lecture meets on Tues & Thurs from 9:30-10:45am in PV 277
Lab sections meet on Thursday 2:30pm to 6:30pm in PV 377
Friday 8:00am to noon in PV 272
Friday 1:00pm to 5:00pm in PV 272

Instructors

Todd Royer Office: MSB-II Room 426
Office Hours: Monday and Wednesday 10:00 to 11:30am, or by appointment
Email: troyer@indiana.edu

Bill Jones Office: SPEA Room 347
Office Hours: Tuesday 1:30 to 4:30pm, or by appointment
Email: joneswi@indiana.edu

Teaching Assistants: Julia Bond, julabond@indiana.edu, Thurs 12:30-2:00pm, PV 375
Melanie Arnold, melaarno@indiana.edu, Tues 12:00-1:30pm, PV 375
Andy White, andbwhit@indiana.edu, Weds 11:30am-1:00pm, PV375

Course description: Limnology is the study of the structure and function of inland waters. Limnology is inherently interdisciplinary, drawing on principles of physics, chemistry, geology and biology. The focus of the course will be process-oriented and comparative. Students will be introduced to physical processes, biogeochemical cycles, and the dynamics of freshwater biota. In studying the way lake and river systems function, the effects of human interaction with aquatic systems will be highlighted. Limnology is a field-based science. Field and laboratory exercises are essential to our study and are linked with lecture material to help students integrate diverse limnological concepts.

Prerequisites: A **college-level course in biology and chemistry**, or permission of the instructor. The lecture and laboratory material will be presented at a level that assumes a basic college-level knowledge of chemistry and biology. It is also assumed that students have a **working knowledge of algebra**.

Textbooks

Wetzel, Robert G. 2001. *Limnology – Lake and River Ecosystems,* 3rd edition, Elsevier/ Academic Press, San Diego.

Jones, William W. 2010. *Laboratory Manual for Limnology*. (available at TIS and IU bookstores.)

NOTE: we may on occasion provide additional handouts that you are expected to read. These will be distributed via *Oncourse*. We also will rely on *Oncourse* for class announcements, distribution of lab data, posting of grades, etc.

Laboratory

In the laboratory, students will be introduced to physical, chemical and biological measurements of freshwater systems. Students will interpret the data they themselves collect and analyze in their lab reports. Therefore, competence in sample collection and analysis is essential. Proper sampling techniques, analytical procedures, and the identification and enumeration of selected plankton, macroinvertebrates, and fish are some of the topics emphasized in lab. While our overall approach is process-oriented, we emphasize the taxonomy of aquatic organisms to give the student an appreciation of the complexity and diversity of not only the organisms themselves but also their functional role in aquatic systems. **Friday lab sections meet in PV 272 unless otherwise noted. The Thursday section meets in PV 377 unless otherwise noted**.

We will be using chemical reagents in the lab that may react adversely with your clothing should you spill on yourself. Therefore, wear "casual" clothes to the lab. Limnologists are not deterred by inclement weather, unless it poses a safety threat (e.g., lightning, tornados). On field days, you should be prepared to go outdoors. You'll need foot wear that can get wet or muddy, rain gear, and possibly sunscreen. A magnifying glass and a pocket knife often come in handy.

Laboratory attendance is mandatory! Unexcused lab absences or obvious lack of preparation for labs will result in up to 5% penalty. Superior lab performance could gain a student up to +5%. We expect students to be fully prepared for each lab by reading and understanding the week's material in the *Laboratory Manual*. Late class assignments will be down graded 10% for each day past the due date.

Course Evaluation & Grading Evaluation of your performance will be based on the following:

Lab Practical Exams (3 @ 10% each)	30%
Lab Report 1	10%
Lab Report 2	20%
Mid-term Exam	20%
Final Exam	20%

TOTAL 100% (+/- 5% for lab attendance/competence)

No make-up examinations will be given in this course! Should you have an unexcused absence from an exam, your grade will be zero. There are only very rare circumstances for which incompletes or excused absences from tests are appropriate.

Final grades will be based on the following scale:

90% - 100%	A's	60% - 69%	D's
80% - 89%	B's	< 60%	F
70% - 79%	C's		

We will use +/- grading and may adjust this scale (in your favor) depending on the final distribution of scores.

Academic Integrity & Student Responsibilities

Your responsibilities are to attend all the lectures and labs, ask questions, prepare ahead for laboratories, participate actively in your lab group, complete assignments on time, and express yourself creatively and concisely in your work. We will do our best to be clear, organized, and fair.

Please familiarize yourself with the *Indiana University Code of Student Rights, Responsibilities, and Conduct*. It is available on-line at:

http://www.iu.edu/~code/code/index.shtml

My rules for cheating are simple: if you are caught cheating on an exam or knowingly commit plagiarism, you will receive an F for the course and the incident will be reported to the Dean of Students for further action.

Tentative Lecture & Laboratory Schedule for Fall 2010

Week	Date	Lecture / Lab Topic
1	Tue, 8/31	Introduction / Water as an environment; **Wetzel Chapter 2**
	Thu, 9/2	Lake origins & morphology; Wetzel **Chapters 3 and 4**
	LAB:	Physical, chemical, & biological methods (**meet in PV 375**)
2	Tue, 9/7	Fate of heat & light; **Wetzel Chapters 5 and 6**
	Thu, 9/9	Lake circulation; **Wetzel Chapter 7**
	LAB:	**Field trip** – University Lake
3	Tue, 9/14	Structure & productivity of aquatic systems; **Wetzel Chapter 8**
	Thu, 9/16	Plankton taxonomy & biology (*Jones*)
	LAB:	Plankton – study live specimens
4	Tue, 9/21	Oxygen dynamics & redox; **Wetzel Chapter 9** (*Johnson*)
	Thu, 9/22	Phosphorus cycling in lakes; **Wetzel pages 239-269**
	LAB:	Discuss University Lake data; quantitative analysis of plankton
5	Tue, 9/28	Nitrogen cycling in lakes; **Wetzel Chapter 12**
	Thu, 9/30	Inorganic carbon cycling in lakes; **Wetzel Chapter 11**
	LAB:	**Practical Exam #1** – plankton
6	Tue, 10/5	Lotic ecosystems
	Thu, 10/7	Ecology of aquatic macroinvertebrates (*Jones*)
	LAB:	Macroinvertebrates – discussion and study of preserved specimens
7	Tue, 10/12	Global climate change: impact on lakes
	Thu, 10/14	Paleolimnology; **Wetzel Chapter 24**
	LAB:	**Field trip** – survey of Clear Creek; **Lab Report #1 due**
8	Tue, 10/19	Mid-term review
	Thu, 10/21	**Mid-term Exam**
	LAB:	Analysis of Clear Creek samples
9	Tue, 10/26	Phytoplankton ecology & dynamics (*Jones*)
	Thu, 10/28	Zooplankton ecology & dynamics (*Jones*)
	LAB:	**Field trip** – University Lake
10	Tue, 11/2	Seasonal succession in plankton; **Wetzel pages 358-375**
	Thu, 11/4	Community ecology / trophic cascades; **Wetzel pages 460-468**
	LAB:	**Practical Exam #2** – macroinvertebrates; analysis of plankton samples from second trip to University Lake

Week	Date	Lecture Topic	Reading
11	Tue, 11/9	Guest lecture by Prof. Hall (IU Biology)	
	Thu, 11/11	The fishes (*Jones*)	
	LAB:	Discussion of the fishes; identification of representative fish	
12	Tue, 11/16	Eutrophication and P loading models; **Wetzel pages 269-288**	
	Thu, 11/18	Guest lecture by Prof. Carlson (Kent State University)	
	LAB:	**Field trip** – electrofishing on White Lick Creek; **Lab Report #2 due**	
13	Tue, 11/23	Bacterioplankton and decomposition; **Wetzel Chapter 17**	
	Thu, 11/25	No Class – Thanksgiving Break	
	LAB:	No Lab – Thanksgiving Break	
14	Tue, 11/30	Biology of macrophytes; **Wetzel Chapter 18**	
	Thu, 12/2	Littoral communities; **Wetzel Chapter 19**	
	LAB:	Analysis of Clear Creek and White Lick Creek fish	
15	Tue, 12/7	Whole lake experiments / GLEON	
	Thu, 12/9	Final Exam review	
	LAB:	**Practical Exam #3** – fish	
16	**Final Exam: 10:15am - 12:15pm, Thursday, December 16th**		