

E455 LIMNOLOGY - FALL 2005

(4 credit hours)

Lecture: T & TH 9:30-10:45 AM SPEA 272
Lab: Fri. 8:00 - 12:00pm SPEA 272
Fri. 1:00 - 5:00pm SPEA 272

<u>Instructors</u>	<u>Office</u>	<u>Phone</u>	<u>Office Hours</u>
Jeff White E-Mail: WHITEJ (Secretary – Patricia Withered, SPEA 330, 5-0731)	SPEA 331	5-0731	Wed 10:30am – 1:30pm (please call or E-mail ahead)
Bill Jones E-Mail: JONESWI (Secretary – Kathy Perry, SPEA 340, 5-4556)	SPEA 347	5-4556	Tues 1:00 – 4:00pm (other times by appointment)
<u>A.I.s</u> Aaron Johnson Nathan Saxe	SPEA 375 SPEA 375	5-1600 5-1600	

Course web page: <http://www.spea.indiana.edu/joneswi/e455/>

COURSE DESCRIPTION:

Limnology is the integrated science of inland waters. Principles of physics, chemistry, geology and biology combine to form the basis for understanding how lakes and streams function as aquatic ecosystems. 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 stream systems function, the effects of human interaction with aquatic systems will be highlighted. Field and laboratory exercises are essential to our study and are linked with lecture material to help students integrate diverse limnological concepts.

PREREQUISITES:

- College-level chemistry and biology, or consent of instructor
- Interest in and desire to learn more about aquatic systems!

TEXTS:

Wetzel, Robert G. 2001. *Limnology – Lake and River Ecosystems*, 3rd edition, Saunders College Publishing, Academic Press, San Diego.
Jones, William W. 2005. *Laboratory Manual for Limnology*. (available at TIS and IU bookstores.)
Needham, J.G. and P.R. Needham. 1989. *A Guide to the Study of Fresh-Water Biology*, 5th edition, Holden-Day, Inc., San Francisco. (optional)

EQUIPMENT:

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. On field days, you'll need foot wear that can get wet, rain gear, and possibly sunscreen. A magnifying glass and a pocket knife often come in handy.

EVALUATION:

Performance in the course will be evaluated based upon the following:

lab practical exams (3) - 10% each;	30% total
lab reports (2) – 10% on 1st, 20% on 2nd;	30% total
lab report #1 due: October 14 by 5:00pm	
lab report #2 due: November 18 by 5:00pm	
lab attendance/demonstrated competence	+/- 5%
exams (2) - 20% each;	40% total
exam 1 - October 20, in class	
exam 2 - December 15, 5:00 – 7:00pm	
	100%

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 points for each day past the due date. No make-up examinations will be given in this course! Should you have an unexcused absence from an exam, your grade will be zero. Consult the Indiana University [Academic Handbook](#) for a description of the few circumstances for which incompletes or excused absences from tests are appropriate. The [Academic Handbook](#) also explains the Indiana University policy regarding academic dishonesty.

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.

TENTATIVE LECTURE SCHEDULE:

8/30	Introduction/Watershed concept	11/1	Phytoplankton biol. & dynamics
9/1	Lake basin morphology	3	Zooplankton biol. & dynamics
9/6	Fate of light and heat	8	Ecology of plankton in lakes
8	Lake circulation patterns	10	<i>The fishes</i>
13	Photosynthesis/respiration in lakes	15	Plankton dynamics (cont)
15	<i>Plankton taxonomy & biology</i>	17	Community Ecology
20	Oxygen dynamics in lakes	22	Littoral communities
22	Phosphorus dynamics in lakes	24	Thanksgiving break
27	Nitrogen dynamics in lakes	29	Macrophyte biology
29	Inorganic carbon cycling in lakes	12/1	Cycling of organic matter
10/4	Watershed influences on nutrient dynamics	6	Whole lake experiments
		8	Review for final exam
6	<i>Stream ecosystems</i>		
11	Lake genesis		
13	Paleolimnology		
18	Review for exam 1		
20	Exam #1		
25	Cycling of iron and sulfur		
27	Discussion of exam 1/cycles (cont)		

LABORATORY SCHEDULE:

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, student competence in sample collection and analysis is essential. Proper sampling techniques, chemical 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.

Sept. 2	Physical, chemical and biological methods in limnology; use of field and laboratory equipment and instruments.
Sept. 9	<u>Field Trip</u> : University Lake.
Sept. 16	Plankton: Study live specimens.
Sept. 23	Discuss University Lake Data; Quantitative analysis of plankton samples.
Sept. 24-25	Overnight field trip to Crooked Lake Biological Field Station
Sept. 30	<u>Practical Exam #1</u> - Plankton.
Oct. 7	Macroinvertebrates: Discussion; study preserved specimens.
Oct. 14	<u>Field Trip</u> : Longitudinal Survey of Clear Creek; <u>Lab Report #1 due</u> .
Oct. 21	Analysis of Clear Creek Samples.
Oct. 28	<u>Field Trip</u> : University Lake
Nov. 4	<u>Practical Exam #2</u> - Macroinvertebrates. Quantitative analysis of plankton from second University Lake trip.
Nov. 11	Fish: discussion; key out representative fish.
Nov. 18	<u>Field Trip</u> : Electrofishing on White Lick Creek; <u>Lab Report #2 due</u> .
Nov. 25	Thanksgiving - no lab (something to be thankful for?)
Dec. 2	Analysis of Clear Creek and White Lick Creek fish.
Dec. 9	<u>Practical Exam #3</u> : Fish.