

Stream Ecology BIOL 4440/5440

Spring 2017

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Office Hours: Monday & Wednesday 3:00 - 4:00 or by appointment. See note below.

Time and Place: Lecture-Tuesday/Thursday 11:00 – 12:20, EESAT Room 338

Thursday Laboratory – 1:00 – 5:00, EESAT Room 359.

Required Text: *Methods in Stream Ecology 2nd edition* by Hauer and Lamberti

Supplemental materials will be provided as needed throughout the course

Attendance: Attendance is expected in both the lecture and the laboratory.

Stream Ecology has only been recognized as a major sub-discipline of ecology and limnology in the past few decades. Methods for teaching it and which core components to emphasize have therefore not been widely agreed upon among stream ecologists. In this course, our goals are relatively broad and we hope to provide an awareness of many areas and issues. Additionally, the course will provide tools that can be applied to evaluate the ecology flowing waters. Because of our location, we will be biased in using examples from prairie streams and rivers; however, we will discuss characteristics of streams from other ecoregions to familiarize you with scales, patterns, and processes in the absence of direct experience.

There will be two over-arching concepts explored during the course:

Physical – Chemical Characteristics of Stream ecosystems

Biological Characteristics of Stream ecosystems

However, while there will be a few times when the class will discuss these concepts separately because of the interactions of abiotic and biotic factors in aquatic ecosystems most often the concepts will be integrated.

Goals: At the end of the semester, each student is expected to be knowledgeable and competent in the following areas:

- 1) Terminology in the field of stream ecology,
- 2) Equipment used in stream ecology,
- 3) Measurement of the physical, chemical, and biological qualities of streams, and how these attributes interact,
- 4) Ecological processes in streams and the processes vary over distance and time,
- 4) What those characteristics mean in terms of stream health and proper resource management,
- 5) How and why major biological communities vary in a lotic system.

COURSE PHILOSOPHY

The course is structured to insure that students taking the course develop a set of skills that will enable them to function as effective aquatic field biologists. By the end of the course, each student should be capable of:

- 1) Designing a field study (which includes generating testable hypotheses and choosing appropriate equipment),
- 2) Going into the field and conducting the field study,
- 3) Analyzing, interpreting, and writing up the results of the field study in a professional manner acceptable to either an employer, a research supervisor, or a professional journal. To achieve this end the course includes a series of exercises, each of which builds upon the previous exercises.

COURSE APPROACH

This course is designed for graduate or advanced undergraduate students, with an interest in stream ecology. The instructors assume that students taking this class are scholars. As such, students are expected to actively participate in the class.

Course Outline and TENTATIVE Schedule, i.e. this schedule will vary.

Date	Lecture Topics (Tues./Thurs.)	Laboratory Topics (Thursday 1-4)
Physical – Chemical Characteristics of Stream ecosystems		
Week of		
Jan 17	<p>Introduction and History Stream Ecology</p> <p>Video River Webs – overview of stream functions and interactions.</p> <p>The physicochemical environment – Lecture ... practical applications to follow in the laboratory</p> <p>Readings: Hauer & Lamberti Chapter 1. & Hynes, HBN. 1975. A Stream and its Valley (reading) – available on Blackboard. (read this paper before Thursday class).</p>	<p>General Introduction. Good Laboratory Practices. Introduction to measurement of physio-chemical parameters using meters and titration techniques.</p> <p>Prep leaf packs for long-term study of leaf breakdown. For background read the Introduction section found in : Hauer and Lamberti Chapter 30- <i>Decomposition of Leaf Material</i>.(pages 711-713).</p>
Jan. 24	<p>The physicochemical environment – Lecture ... On Thursday lecture Laboratory combined - practical applications and introduction to identification of macroinvertebrate identification</p>	<p>Thursday - Lecture/Laboratory combined</p> <p>Discharge Measurements and Stream Flow Analysis, Habitat Analysis and Biomass and Pigments of Benthic Algae in KDELA.</p> <p>Benthic macroinvertebrates examples will be available to look examine.</p>
Jan. 31	<p>Geomorphology II- river forms and processes</p> <p>Readings: Hauer and Lamberti Chap. 2 p. 23-49.</p>	<p>GPS, GIS – Mapping and Watersheds. Lecture - Lab combined ... guest instructor Dr. Bruce Hunter</p> <p>Readings: Hauer and Lamberti Chapter. 2 pp. 23-49.</p>
Stream Biota		
Feb. 7	<p>Material Transport, Update, and Storage</p> <p>Readings: The Introductions of Hauer and Lamberti Chapters 9,10,11</p>	<p>Lab Field Trip: Discharge Measurements and Stream Flow Analysis, Habitat Analysis, Physio-chemical measurements. Periphyton measurements.</p> <p>Collection of macroinvertebrates from different habitats for later analyses in the laboratory.</p>
Feb. 14	<p>Energy Sources in Streams Heterotrophic Reading: Hauer and Lamberti Chapter 13.</p> <p>Opportunity #1 - 16 February</p>	<p>Techniques for analysis of the data from Field Trip 1 (Handouts) and Introduction to leaf drift. (Hauer and Lamberti Chapter 13 pp 273-287).</p>

Feb. 21	Stream biota - who, what, where. Challenges and challenges and solutions to life in moving fluids: Readings: Hauer and Lamberti Chapter 20 p 435	Field trip- Leaf drift; Material Storage and Transport; Transport and Retention of CPOM
Feb. 28	Biotic – Abiotic interactions - community structure and species diversity	Benthic macroinvertebrates. Introduction to identification, adaptations to habitats. Begin to process macroinvertebrates (Hauer and Lamberti Chapter 20 pp 435-463)
Mar. 7	Biotic interactions – trophic relationships ... functional feeding groups and food webs Readings: Hauer and Lamberti Chapter 25 page 585 Opportunity #2. – March 9	Trophic Relationships of Macroinvertebrates Functional Feeding Groups Predator-Prey Interactions <i>Trophic Relationships of Macroinvertebrates using</i> from benthic macroinvertebrate collections) Readings: Hauer and Lamberti Chapter 24 & 25 pp 561-583 & 585 – 601.
Mar. 14	Spring Break	Spring Break
Mar. 21	Macroinvertebrate Dispersal – role of insect assemblages in stream and terrestrial communities Chapter 21 (pp. 465-487).	Field trip - Sampling Fish Communities – Rob Cook EPA Hauer and Lamberti, Chapter 22, p. 489-514.
Mar. 28	Fish Communities Readings: Hauer & Lamberti Chapter 22	Lab prep for overnight trip. Leaf \pack processing. (Hauer and Lamberti Chapter 30 pp 711-713).
Apr. 4	Goals for the overnight field trip. Introduction to sampling techniques, methods and what to consider when collecting.. .	Overnight lab measuring 24 hours cycles. (Turner Falls or other suitable site)
Apr. 11	Indicators of Macroinvertebrates of Biotic Environmental Quality Opportunity #3 – April 11	Tentative Field trip- Macrophytes – LAERF
Apr. 18	Modification of Running waters by humankind: Evaluating Stream Health:	Laboratory groups meet – activity preparation of samples, data and analysis for group presentation. Instructors available for assistance
Apr. 25	Modification of Running waters by humankind: Evaluating Stream Health;	Lab groups meet for last opportunity to continue synthesizing and organizing for presentation.
May 2	Conservation of streams: a prospectus on the future Readings: Hauer & Lamberti Chapter 35	May 4th Lecture and Lab combined -Group presentations ... A synthesis of what you learned in lab. What does it all mean? Bubba Biologist Celebration
May 9	Final Exam	

Readings: In addition to the readings listed above other reading materials will be assigned during the semester; these materials will either be made available as pdf files through the blackboard or downloading from UNT's library holdings. At times, you may be required to search the scientific literature for additional information, using resources other than the internet.

Grading: Short quizzes will be administered unannounced throughout the semester. These will be based on previous lectures and assigned readings. There are no make-ups for quizzes. The quizzes, will in part, be used to help me gauge the progress of the class and as part of the "participation score" (see below). Lecture examinations (4) will account for 80% of your lecture grade; **20% of your grade** will be based on quizzes, attendance and class participation. The final grade will be calculated by averaging your lecture and laboratory scores.

Attendance: Attendance is expected.

Important Dates:

January 31 – April 4, 2017	Student may drop a course with written consent of instructor.
February 24, 2017	Last day for change in pass/no pass status.
February 24, 2017	Last day to drop a course or withdraw from the university with a grade of W for courses a student is not passing. After this date a grade of WF may be recorded.

STUDENT RESPONSIBILITIES

Your responsibilities are to attend all the lectures and labs, ask questions, prepare ahead for class and laboratories, participate actively in the lab, complete assignments on time, and express yourself creatively and concisely in your work.

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. Stream fieldwork in winter and early spring season in Texas may be cold! You will need foot wear that can get wet, rain gear, and warm clothes. UNT has some chest waders in a variety of sizes (some with holes and fungal cultures with species unknown to science). I strongly encourage each student to acquire his or her own pair of hip boots or chest waders.

Laboratory attendance is mandatory. You cannot master stream ecology from a book. We have designed this course to be as much *hands on* and with as many practical experiences as possible.

There will be many times when lecture and laboratory will be combined or we might have lecture in the lab or during part of the lab. If you anticipate not being able to participate in the laboratory, I suggest that you drop the course. Late assignments will be downgraded 10 points for each day past the due date.

ADDITIONAL COURSE POLICIES

1. My office is open to students. If you cannot meet during my scheduled office hours contact me we will find a time to meet. If you have any problems with the course come see me right away. I will within reasonable limits work with you to help you through the course. However, I cannot help you raise a failing grade during the last weeks of the course. In fairness to the other members of the class, I cannot assign individual extra credit work to pull up required course work.
2. If you do not understand something in class--raise your hand and ask a question! More than likely, other students are having the same problem. There is no such thing as a stupid question.
3. Cheating and Plagiarism are forms of academic dishonesty that will not be tolerated. If a student is caught cheating it will result in a 0% for that test or assignment. A second act of cheating will result in an "F" for the course. There will be writing assignments in the laboratory and lecture that will require original literature research; plagiarism (copying and pasting from scientific works or internet resources without proper citations) is considered cheating.

Disability Accommodation:

"The University of North Texas makes reasonable academic accommodation for students with disabilities. Students seeking accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with an accommodation letter to be delivered to faculty to begin a private discussion regarding your specific needs in a course. You may request accommodations at any time, however, ODA notices of accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of accommodation for every semester and must meet with each faculty member prior to implementation in each class. For additional information see the Office of Disability Accommodation website at <http://www.unt.edu/oda>. You may also contact them by phone at 940.565.4323."