Stream Ecology BIOL 4440/5440
Fall 2015

Instructor: Dr. James H. Kennedy
Regents Professor
Department of Biological Sciences
Office: EESAT 310F,
Telephone 940-565-2981
Email (preferred method of contact), kennedy@unt.edu

Office Hours: Monday & Wednesday 3:00 - 4:00 or by appointment. See note below.
Time and Place: Lecture-Friday 0900 - 11:50, EESAT Room 338
Laboratory – 1:00 – 4:00, EESAT Room 359.
Required Text: Hauer & Lamberti Methods in Stream Ecology
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:

Familiar with terminology in the field of stream ecology
Familiar with equipment used in stream ecology
Understanding ecological processes in streams and how they vary over distance and time
Understanding basic stream hydrology and how to measure and calculate important metrics
Assessing a stream's physical, chemical, and biological qualities, how they interact, and what those characteristics mean in terms of stream health and proper resource management.
Understanding 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 setting up a field study (which includes generating testable hypotheses and choosing appropriate equipment)

2) going into the field and collecting data,

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 assumption is made by the instructors that students taking this class are scholars. As such students will be expected to actively participate in the class. This will not be a lecture - regurgitation class. The course will be presented in a seminar format prepared and presented by the instructors and the students. There will be weekly readings. Throughout the semester student will be selected to develop of papers selected for discussion and lead a discussion on that paper. It is anticipated that we will have approximately 3-4 papers per week.

Class Structure: Each weekly class meeting will be divided into three segments:

1) Introductory remarks and background information:

2) Overview and discussion of the week's reading/study assignments. These will be prepared and presented by students enrolled in the course.

3) The last segment of each class period will be devoted to group discussion, synthesis and paper writing. The class will be divided into 3 groups. Each group will discuss the week's readings, presentations and then write a summary paper incorporating this information and addressing a series of questions about the material. At the end of class each group will email their summary paper to the other groups and the instructors. Groups will be re-assigned at approximately 3 week intervals.

4) On class days when we have opportunities we will modify this schedule.

4) The laboratory will begin at 1:00. There may be some days we will leave at 11:00 for the laboratory.

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

Date	Lecture Topics	Laboratory Topics
Physical – Chemical Characteristics of Stream ecosystems		
Aug. 28	Introduction and History Stream Ecology Video River Webs. Prepare leaf packs.	General Introduction. Good Laboratory Practices. Leaf Pack preparation. **Readings:** Hauer and Lamberti Chapter 30 p 711-719; Handouts.
Sept. 4	The physicochemical environment – Lecture … practical applications to follow in the laboratory **Readings**: Hauer & Lamberti Chapter 1. & Hynes, HBN. 1975. A Stream and its Valley (reading)	Introduction to measurement of physico-chemical parameters using meters and titration techniques. Information on leaf pack study. **Readings:** Hauer and Lamberti Chapter 3; Handouts. Chapter 30 p 711-719
Sept. 11	Geomorphology II- river forms and processes **Readings:** Hauer and Lamberti Chap. 2 p. 23-49.	GPS, GIS – Mapping and Watersheds. Lecture - Lab combined … guest instructor Dr. Bruce Hunter **Readings:** Hauer and Lamberti Chap. 2 p. 23-49.
Stream Biota		
Sept. 18	Energy Sources in Streams **Readings:** The Introductions of Hauer and Lamberti Chapters 9,10,11	Introduction to methods for determination of biomass and photosynthetic pigments of Benthic Algae - rocks and artificial substrates. **Readings**: Hauer and Lamberti Chapter 17 p. 357; Hauer and Lamberti Chapter 20. Appendix 20.1 p. 455-464.
Sept. 25	Stream biota - who, what, where. Challenges and challenges and solutions to life in moving fluids:	**Field Trip:** Discharge Measurements and Stream Flow Analysis, Habitat Analysis, Physico-chemical measurements. Collection and preservation of macroinvertebrates from different habitats.
Oct. 2	Biotic – Abiotic interactions - community structure and species diversity	Techniques for the analysis of physicochemical, habitat variables measured on 25 Sept.. **Readings**: Hauer and Lamberti Chap. 1-5 p. 1-117
Oct. 9	Opportunity #1. Macroinvertebrates – who are they what do they do and how can we use them in Bioassessments **Readings**: Hauer and Lamberti Chapter 20.	Introduction to the major orders of Aquatic invertebrates. Process macroinvertebrates collected on 18 Sept.. **Readings**: Hauer and Lamberti Chapter 20. Appendix 20.1 p. 455-464.
Oct. 16	Biotic interactions – trophic relationships … functional feeding groups and food webs **Readings:** Hauer and Lamberti Chapter 25 page 585	Trophic Relationships of Macroinvertebrates; Functional Feeding Groups. **Readings:** Hauer and Lamberti Chapter 25 page 585

Oct. 23	Energy Sources in Streams Heterotrophic **Reading**: Hauer and Lamberti Chapter 13.	**Field trip-** Leaf drift; Material Storage and Transport; Transport and Retention of CPOM
Oct. 30	The River Continuum Craze/ Nutrient Spiraling	Processing leaf pack samples set out Aug. 28. **Readings**: Hauer and Lamberti Chapter 30 p 711-719
Nov. 6	Fish Communities **Readings**: Hauer & Lamberti Chapter 22	**Field Trip:** Sampling Fish Communities **Readings:** Hauer and Lamberti, Chapter 22, p. 489
Nov. 13	Modification of Running waters by humankind: Evaluating Stream Health:	Organization day – or makeup date
Nov. 20	Conservation of streams: a prospectus on the future **Readings**: Hauer & Lamberti Chapter 35	**Group presentations … A synthesis of what you learned in lab. What does it all mean?** **Bubba Biologist Celebration**
Nov. 27	Thanksgiving no Class	Thanksgiving no Class
Dec.4	Study Day no Class	Study Day no Class. Final Paper due on Dec.3, 2015
Dec. 9	Final Examination 8:00 – 10:00	

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 be available for download from UNT's library holdings.

D**iscussion leader**: Each student in the class will prepare a presentation based upon the assigned readings. The presentation will be done in powerpoint and should be approximately 35 minutes in length with a 15 min question discussion period to follow. The presentation will provide an overview of the readings and should be designed to invite discussion. Presentations will be evaluated by both the instructor and students in the class. Presentations will be evaluated based on the presenter's knowledge of the topic and ability to answer questions. The aim of this exercise is develop presentation skills. You will be primarily evaluated on the content presented and your knowledge of the topic being discussed. The number of students in the class will determine the number of presentations each individual will need to prepare

Grading: Short quizzes will be administered unannounced throughout the semester. They will be based on previous lectures and assigned readings. There are no make-ups for quizzes. The quizzes in part will be used to help me gauge the progress of the class and as part of the "participation score" (see below). Lecture examinations (2) will account for 80% of your lecture grade. 10% of your grade will be based on attendance and class

participation. Another 10% will be based on the discussion presentations. The final grade is calculated by averaging your lecture and laboratory scores.

Discussion leader: Each student in the class will prepare a presentation that provides an overview of the paper related to the topics being discussed on a given week. In order that everyone has the same time to prepare the paper will be assigned the Friday the week before the presentation is given. The presentation will be done in powerpoint and should be approximately 35 minutes in length with a 10 min question period to follow. Presentations will be evaluated by both the instructor and other students with the objective to provide feedback to the presenter. Presentations will be evaluated based on the presenter's knowledge of the topic, clarity, visual presentation quality, and ability to answer questions about the subject being discussed.

Attendance: Attendance is expected.

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 field work in October and November 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). Needless to say I strongly encourage each student to acquire his or her own pair of hip boots or chest waders.

Laboratory attendance is mandatory. There will be many times lecture and laboratory will be combined or we might have lecture during part of the lab. You cannot master stream ecology from a book. If you anticipate not being able to participate in the laboratories 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 met 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 you extra credit work to pull up required course work.

2. If you don't 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.

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."