

Stream Ecology BIOL 4440/5440

Spring 2021

Instructor: Dr. James H. Kennedy
Regents Professor
Department of Biological Sciences
Office: EESAT 310F,
Email kennedy@unt.edu

Office Hours: Monday & Wednesday 9:00 - 10:00 or by appointment. See note below.

Time and Place: Lecture-Tuesday/Thursday 11:00 – 12:20, Synchronous vis ZOOM

Thursday Laboratory – 2:00 – 5:00, EESAT Room 359.

Required Text: *Methods in Stream Ecology Volume 1: Ecosystem Structure 3rd edition* by Hauer and Lamberti (editors). Supplemental materials will be provided as needed throughout the course.

Course Structure: Stream Ecology will be taught using a hybrid approach. The lecture will be taught synchronously using ZOOM (T/Th 11:00-1220). The laboratory will be taught on Thursdays from 2:00-5:00. Attendance is expected in the lecture and laboratory.

Attendance: Attendance is expected in both the lecture and the laboratory. Because the lectures are taught synchronously, and the lab is F2F they **will not be recorded**. Power points and supplemental information will be provided via Canvas

Course Minimum Technology Requirements -for both Lecture and Lab

Student success in a remote teaching environment requires specific technological resources.

Course Minimum Technology Requirements for both the lecture and laboratory.

- Computer with a camera, speakers and microphone
- Reliable internet access sufficient to use ZOOM and Canvas Technical Requirements (<https://clear.unt.edu/supported-technologies/canvas/requirements>)
- At this time, lecture tests will be given during the laboratory. However, if the laboratory is switched to remote teaching, your computer must be capable of operating in the lockdown mode of Respondus.

The laboratory will be taught Face to Face. I believe that students taking an ology course need to have hands-on experiences. This will be provided through laboratory and associated field activities. The laboratory meets on Thursday from 2:00 to 5:00. While I hope that the laboratory will continue Face to Face throughout the semester, if COVID-19 infection rates increase, both instructors and students need to be aware that the lab will also be taught remotely. Please refer to the Laboratory Syllabus for complete details.

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 regarding 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 ensure 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 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. The outline includes both lecture and laboratory topics to emphasize the connectivity. The Laboratory instructor will provide a more detailed laboratory syllabus. Unless specified chapters listed refer to readings in Hauer and Lamberti.

Date	Lecture Topics (Tues./Thurs.)	Laboratory Topics (Thursday 2-5)
Physical-Chemical Characteristics of Stream ecosystems		
Week of		
Jan 12-14	<p>Introduction, overview and expectations for the class and History Stream Ecology</p> <p>Video River Webs – overview of stream functions and interactions.</p> <p>The Watershed and Community Structure a broad perspective</p> <p>Readings: Hauer & Lamberti Chapter 1. & Hynes, HBN. 1975. A Stream and its Valley (Assigned reading)</p>	<p>First Lab - ZOOM</p> <p>General Introduction to the lab exercises.</p> <p>Good Laboratory Practices.</p> <p>Leaf pack experiment – an introduction to a semester-long project.</p> <p>For background read the Introduction section found in Hauer and Lamberti, Methods in Stream Ecology 2st edition, Chapter 27- <i>Leaf Litter Breakdown</i> (pages 71-82). This chapter will be supplied.</p>
Jan. 19-21	<p>Geomorphology - river forms and processes</p> <p>Readings: Chapter1 Riverscapes p. 3-19. Chapter 2 Valley Segments, Stream Reaches, and Channel Units. Readings: Chapter. 1, Section 1.3 <i>Specific Methods</i>, 1.3.1 <i>Basic Method 1: Boundaries and Hydrography of the Catchment Basin</i>. pp. 13-19 & Chapter 2, Section 2.3, 2.3.1 <i>Basic Method: Valley Segment, Stream Reach, and Channel Unit Classification</i>.</p>	<p>Watershed Activity on personal computer</p> <p>KDELA-. Introduction to measurement of physio-chemical parameters/titration techniques and calibration (In-class handouts, Chapter 2)</p>
Jan. 26-28	<p>Physico-chemical properties of water.</p>	<p>Assigned groups & transects. (Habitat Assessment I)</p> <p>Introduction to Habitat & measuring Discharge Measurements</p>

Stream Biota		
Feb 2-4	Stream biota flora & invertebrate and vertebrate fauna Energy Sources in Streams Readings: <i>Introduction to Chapter 11 Benthic Stream Algae: Distribution and Structure, Chapter 12 Biomass and pigments of Benthic Algae and Chapter 13 Macrophytes and Bryophytes</i>	Biomass and Pigments of Benthic Algae in KDELA. (Chapter 12)
Feb. 9-11	Recap Opportunity #1 - 11 February	HQI (Habitat Assessment III) in KDELA (TCEQ manual). Finish Pigment Analysis
Feb. 16-18	Introduction to Freshwater Invertebrates Chapter 15 Macroinvertebrate.	Nutrient Limitations and Excesses – Nitrogen & Phosphorus – Handouts Lab Report Rubric, Citation lesson
Feb. 23-25	Biotic – Abiotic interactions - community structure and species diversity. Challenges and challenges and solutions to life in moving fluids: Readings: Chapter 8 Hyporheic Zone, Chapter 14 Meiofauna, 14.1 Introduction,	Introduction to aquatic macroinvertebrates, identification, adaptations to habitats, processing (Chapter 15))
Mar. 2-4	Chapter 15 Macroinvertebrates Biotic interactions – trophic relationships ... functional feeding groups and food webs Readings: Chapter 18.1-18.1.2, pp 379-381. <i>Invertebrate Consumer-Resource Interactions.</i> Chapter 20 Trophic Relationships of Macroinvertebrates, pp 413-433 Opportunity #2. – March 4	Begin to process leaf packs, preserve macroinvertebrates. Begin identification of macroinvertebrates Trophic Relationships of Macroinvertebrates. Chapter 20
Mar. 9-11	Aquatic Terrestrial links Macroinvertebrate Dispersal – the role of insect assemblages in the stream and terrestrial communities Chapter 21 Macroinvertebrate Drift, Adult Insect Emergence and Oviposition..	Finish identifying Benthic Macroinvertebrates (handout) Start ash free dry weight of leaf pack samples. Prep samples and schedule muffle furnace
Mar. 16-18	Indicators of Biotic Environmental Quality.	Functional Feeding Groups, Tolerance Values; calculate biotic index. Chapter 20

Mar 23-25	Modification of Running waters by humankind: Evaluating Stream Health:	Fish communities interactive program for assessing and modeling fish numbers (Chapter 22)
Mar 30 Apr 1	Tuesday – catch up Opportunity #3 – April 1	Summarizing & analyzing your stream ecology data, graphs, simple stats, what colors to use in presentations
Apr. 6- 8	Practical Applications of the Stream Ecosystem a Synthesis.	LAB DAY-Laboratory groups meet – activity preparation of samples, data and analysis for group presentation. Instructors available for assistance
Apr. 13-15	Stream ecosystem theory Historical and Recent Perspectives on Stream Ecosystems	Lab -Group presentations . A synthesis of what you learned in lab. Final Lab Report Due @ 2:00PM.
Apr 20- 22	Conservation of streams: a prospectus on the future	Lecture and Lab combined – A synthesis of what you learned in class. What did it all mean?
Apr 27	Final Exam in EESAT	

Readings: In addition to chapters in Hauer and Lamberti Methods in Stream Ecology, additional reading materials will be assigned during the semester. These materials will either be made available as pdf files through the canvas 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: The grade you earn in Stream Ecology is an average of your Lecture grade and Laboratory grade. The Lecture grade is composed of examinations (85%) and participation (15%). There are three lecture examinations and a final examination. All examinations (lecture and final) are equally weighted and will be averaged to determine the lecture portion of your grade. Participation points are based on attendance in both lecture and laboratory & completion of in-class exercises. The final Stream Ecology grade is calculated by averaging your lecture and laboratory scores. Frequently, a short quiz/exercise is given during the class. This quiz is NOT GRADED and is used for attendance. The quiz/exercise provides the student insight into their understanding of subject material, insights into concepts and questions about subjects that may be included in the opportunities.

Final Stream Ecology grade = (lecture percentage + laboratory percentage) / 2

A = 89.5 – 100

B = 79.5 – 89.4

C = 69.5 – 79.4

D = 59.5 – 69.4

F = 59.4 and below

Graduate students will be graded separately from undergraduates and graduate opportunities will have additional questions compared to undergraduate students.

Although I do not anticipate any reason to modify this grading plan, I reserve the right to do so if circumstances warrant. I will inform the class if modifications to the grading scale are necessary.

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. Because of COVID travel restriction, our fieldwork will be restricted to the constructed stream and pond in KDELA. Although this site is next to the EESAT building, there will be times when it will be cold and wet. You will need footwear that can get wet, rain gear, and warm clothes.

Laboratory attendance is mandatory. You cannot master stream ecology from a book. Given the restriction of COVID, we have designed this course to be as much as possible *hands-on*, with practical lab experiences. There may be times when portions of the laboratory will be via ZOOM during lecture hours.

ADDITIONAL COURSE POLICIES

1. My office is open to students via ZOOM. If you cannot meet during my scheduled office hours, contact me, and we will find a time to meet. If you have any problems with the course content, see me right away. I, as well as the laboratory TA's, will, within reasonable limits, work with you to help you through the course. However, we cannot help you raise a failing grade during the last weeks of the course.
2. If you do not understand something in class-- 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:

Students must follow the Procedure for Requesting Special Accommodation, as indicated in the UNT Policy Manual, Volume 3, 18.1.14, part II. According to these guidelines,

"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."

ACADEMIC SUPPORT & STUDENT SERVICES

Mental Health

UNT provides mental health resources to students to help ensure there are numerous outlets to turn to that wholeheartedly care for and are there for students in need, regardless of the nature of an issue or its severity. Listed below are several resources on campus that can support your academic success and mental well-being:

- [Student Health and Wellness Center](https://studentaffairs.unt.edu/student-health-and-wellness-center) (<https://studentaffairs.unt.edu/student-health-and-wellness-center>)
- [Counseling and Testing Services](https://studentaffairs.unt.edu/counseling-and-testing-services) (<https://studentaffairs.unt.edu/counseling-and-testing-services>)
- [UNT Care Team](https://studentaffairs.unt.edu/care) (<https://studentaffairs.unt.edu/care>)

- [UNT Psychiatric Services](https://studentaffairs.unt.edu/student-health-and-wellness-center/services/psychiatry) (https://studentaffairs.unt.edu/student-health-and-wellness-center/services/psychiatry)
- [Individual Counseling](https://studentaffairs.unt.edu/counseling-and-testing-services/services/individual-counseling) (https://studentaffairs.unt.edu/counseling-and-testing-services/services/individual-counseling)

Chosen Names

A chosen name is a name that a person goes by that may or may not match their legal name. If you have a chosen name that is different from your legal name and would like that to be used in class, please let the instructor know. Below is a list of resources for updating your chosen name at UNT.

- [UNT Records](#)
- [UNT ID Card](#)
- [UNT Email Address](#)
- [Legal Name](#)

**UNT eulDs cannot be changed at this time. The collaborating offices are working on a process to make this option accessible to UNT community members.*

Pronouns

Pronouns (she/her, they/them, he/him, etc.) are a public way for people to address you, much like your name, and can be shared with a name when making an introduction, both virtually and in-person. Just as we ask and don't assume someone's name, we should also ask and not assume someone's pronouns.

You can [add your pronouns to your Canvas account](#) so that they follow your name when posting to discussion boards, submitting assignments, etc.

Additional Student Support Services

- [Registrar](https://registrar.unt.edu/registration) (https://registrar.unt.edu/registration)
- [Financial Aid](https://financialaid.unt.edu/) (https://financialaid.unt.edu/)
- [Student Legal Services](https://studentaffairs.unt.edu/student-legal-services) (https://studentaffairs.unt.edu/student-legal-services)
- [Career Center](https://studentaffairs.unt.edu/career-center) (https://studentaffairs.unt.edu/career-center)
- [Multicultural Center](https://edo.unt.edu/multicultural-center) (https://edo.unt.edu/multicultural-center)
- [Counseling and Testing Services](https://studentaffairs.unt.edu/counseling-and-testing-services) (https://studentaffairs.unt.edu/counseling-and-testing-services)
- [Pride Alliance](https://edo.unt.edu/pridealliance) (https://edo.unt.edu/pridealliance)
- [UNT Food Pantry](https://deanofstudents.unt.edu/resources/food-pantry) (https://deanofstudents.unt.edu/resources/food-pantry)

Academic Support Services

- [Academic Resource Center](https://clear.unt.edu/canvas/student-resources) (https://clear.unt.edu/canvas/student-resources)
- [Academic Success Center](https://success.unt.edu/asc) (https://success.unt.edu/asc)
- [UNT Libraries](https://library.unt.edu/) (https://library.unt.edu/)
- [Writing Lab](http://writingcenter.unt.edu/) (http://writingcenter.unt.edu/)