

Stream Ecology BIOL 4440/5440

Spring 2026

Instructor: Dr. Jim Junker (he, him)
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Drop-in Hours: Monday & Wednesday 9:00 - 10:00 or by appointment. See note below.

Time and Place: Lecture-Tuesday/Thursday 11:00 - 12:20, GAB Room 527

Laboratory - Thursday - 2:00 - 4:50, EESAT Room 358.

Laboratory Instructor - Evan Brothers (ScottBrothers@my.unt.edu)

Lab Instructor Drop-in hours: Monday 1-2pm; Thursday 12:30-1:30pm

Required Text: *Stream Ecology: Structure and Function of Running Waters* 3rd edition by Allan, Castillo, and Capps. Supplemental materials will be provided as needed throughout the course.

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

Stream Ecology is the study of running waters and emerged as a major sub-discipline of ecology and limnology in the mid-20th century. In this course, we will explore the physical, chemical, and biological characteristics of stream and river ecosystems. Additionally, the course will provide tools that can be applied to evaluate the ecology of 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.

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 how the processes vary over space and time,
- 4) What do those characteristics mean regarding stream health and proper resource management,
- 5) How and why major biological communities vary in a lotic system.

COURSE APPROACH

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

The lecture portion will be a combination of lectures and activities.

The lab portion will be a combination of hands-on field exercises and small group projects.

Course Outline and TENTATIVE Schedule.

This schedule will vary and updates will be posted on Canvas. The outline includes both lecture and laboratory topics to emphasize connectivity. The Laboratory instructor will provide a more detailed laboratory syllabus. Unless specified, the chapters listed refer to readings in Allan, Castillo, and Capps. Additional optional texts include *Methods in Stream Ecology* (MiSE) and additional readings, these resources will be provided.

Week	Section	Date	Lecture (11:00-12:20)	Lab (2:00 – 4:50)	Readings (Chapters in <i>Stream Ecology</i>)	Lecture Assignment	Lab Assignments	
1	Overview	Jan. 13	Introduction		Ch. 1, Ch. 14			
		Jan. 15	Ecology in & of streams	Intro to lab & group project	Fisher 1997, Doyle and Bernhardt 2011		MiSE Leaf litter breakdown Chapter 27	
2	Hydrology & Geomorphology	Jan. 20	Catchments and Flow regimes		Ch. 2 Hynes 1975			
		Jan. 22	Channel Morphology	Watersheds and flow. Group projects	Ch. 3; Montgomery and Buffinton 1997		Flow Analysis exercise	
3		Jan. 27	Discussion: Changes to the WOTUS		Doyle and Bernhardt 2011 and TBD			
		Jan. 29	Hydrology and sediment transport	Group presentations. Methods intro	Benda et al. 2004	Reading discussion # 1		
4		Feb. 3	The physical and chemical environment		Ch. 4 & Ch. 5; Kaushal et al. 2018,			
		Life in streams	Feb. 5	Open time/Review	Field trip: Group Projects	Frissell et al. 1986		
5			Feb. 10	Exam I				
			Feb. 12	Primary Producers	Field trip: Habitat & Flow	Ch. 6; Rosemond et al. 1993		Habitat Analysis exercise
6			Feb. 17	Heterotrophs		Ch. 7		
			Feb. 19	Discussion: River Continuum concept	Insects	Vannote et al. 1980, Wiley et al. 1990 & TBD		
7			Feb. 24	Behavior & Life histories		MacNeale et al. 2005		

	8	Feb. 26	Trophic relationships	Field Trip: Collection	Ch. 9;		
Mar. 3		Species Interactions		Ch. 10, Power 1990	Reading Discussion #2		
Mar. 5		Community Assembly & Diversity	Insects	Ch. 11; Brown and Milner 2012		Analyzing Community Data	
9		Mar. 10	Spring Break. No classes				
	Mar. 12						
10	Stream Ecosystems	Mar. 17	Exam II				
		Mar. 19	Discussion: Stream Health	Field Trip: Collection	Woodward et al. 2012, Young and Collier 2009; TBD		
11		Mar. 24	Stream Food webs		Ch. 12; Baxter et al. 2005	Reading Discussion #3	
		Mar. 26	Ecosystem Metabolism	Group work	Ch. 14; Odum 1956		
12		Mar. 31	Disturbance and succession		Fisher et al. 1982; Robinson and Uehlinger 2008		
		Apr. 2	Nutrient Cycling	Field Trip: Stream Metabolism & Nutrient Spiraling	Ch. 13; Mulholland et al. 2008		Stream Metabolism & Nutrient Spiraling exercise
13		Apr. 7	Big Rivers		Junk et al. 1989, Hamilton et al. 1992		
		Future perspectives in Stream Ecology	Apr. 9	Emerging Frontiers in Streams	Groupwork	Ch. 15	
Apr. 14					TBD		
Apr. 16			Group work		TBD		
15	Apr. 21				TBD		

		Apr. 23	Discussion: Stream Restoration	Group work	Readings TBD	Reading Discussion #4	
16		Apr. 28	Open Review				
		Apr. 30	Lecture and Lab combined: Final Presentations for lab group projects				
17		May 5	Final Exam 10:00 – 12:00 (Exam III)				

Grading

Grading The grade you earn in Stream Ecology lecture is based on the exercises in the lecture portion. There are three examinations. All examinations are equally weighted. Participation points are based on quizzes, class activities, and engagement in the course.

Regardless of the Lecture – Lab grades, you must receive a minimum of a C in both the Lecture and Lab to receive a B or A.

Usually, a short quiz is given at the beginning of the class. Most quizzes are NOT GRADED but are used to award points on class participation. On occasion, the quiz will be graded, and the points will be added to your semester grade. The quiz provides the student insight into their understanding of subject material, insights into concepts, and questions about subjects that may be included in the readings or additional materials. Quizzes also provide me with feedback about student learning. It must be taken during the allotted time provided in class to get credit for taking the quiz. Simply turning in a quiz with your name on it is not sufficient to receive participation credit.

Grading scale:

A = 89.5 – 100

B = 79.5 – 89.4

C = 69.5 – 79.4

D = 59.5 – 69.4

F = 59.4 and below

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

How is your grade calculated?

This outlines the lecture portion of the course

Assignment Category	Points	Points
	Undergraduate	graduate
“Speed” paper presentation	20	20
Exam 1	100	100
Exam 2	100	100
Exam 3	100	100
Reading discussions	30	30
Participation	100	100
Discussion lectures	--	50
TOTAL	450	500

Differential expectations for graduate students

As a co-listed course, both undergraduate and graduate students are enrolled in the class. For graduate students, the following expectations are required:

1. Graduate students prepare individual “Paper” presentations (vs. presentations in pairs for undergraduates)
2. Each graduate student must prepare and participate in two (2) graduate student-led discussion lectures (~40 min)
3. Graduate students must answer extra questions on exams (this will be noted when relevant)

Description of major course assignments

Rubrics for assignments are located on Canvas under ‘General Course Resources’

Readings: In addition to chapters in Allan, Castillo, and Capps’ *Stream Ecology*, additional reading materials will be assigned during the semester. These materials will be made available as pdf files through Canvas. Each student will be assigned a paper to present to the class as outlined below.

“Speed” Presentations and Handouts

Description: Student(s) will prepare a handout (1-2 pages) and prepare a short presentation on either a review or research paper that will be assigned to you at the beginning of the semester. The following guidelines provide a general template for review, write-up, and presentation/discussion (12 min/paper) of assigned articles. Please send me the class handout by the day before the paper is assigned in class.

Class Handout:

- I) *Definitions*: Write down words or terms that are new to you in the assigned paper. (Define these terms prior to arrival in class)
 - II) *Summary*: Write a short, objective summary of the paper. Do not evaluate the paper at this point, simply summarize in a few sentences its purpose, main findings and "take home" message.
 - III) *Objectives*: Explicitly state the objectives of the paper, as given by the author(s). What reasons are given to support the importance and/or relevance of the research objectives and/or findings?
 - IV) *Methods*: Are the methods used appropriate and adequate for the questions or hypotheses being addressed? Identify any methods that are not clearly presented or that you do not understand (applies to research papers only).
 - V) *Results*: Outline the main results presented in the paper. How do the results relate to the questions or hypotheses set forth in the objectives? Identify any unclear results.
 - VI) *Discussion*: (Here is where you should offer your personal evaluation of the paper.) How well does the discussion reflect the results? Are interpretations of the data presented in the results section justified, or to what extent are the interpretations and discussion speculative? Does the paper adequately represent both the strengths/weaknesses of the research findings?
 - VII) *Overall*: What do you consider as the main strengths of the paper? What are some weaknesses?
- What is interesting about the paper? What did you learn? What relevance does this paper have to issues or topics that have been discussed in class? What other areas of ecological research can you relate this paper to, either in terms of basic or applied science?

Presentation:

Do not read your handout to the class. Prepare a power-point presentation containing key figures, photos of research area, researchers, etc. Focus your presentation (10-12 min) on research highlights (methods, results, discussion) & implications for future studies and tie the material into class lectures.

Exams:

There are three, non-cumulative exams that will be based on class lectures, readings, labs, and discussion sections. Each exam consists of terminology/definitions, multiple choice, short answers, and/or essay questions. The first two exams will be taken during scheduled class time, and the third exam will be taken during the scheduled final exam date/time. Exams must be completed during the class period unless previous arrangements have been made.

Written responses:

There are four short, outside-of-class writing assignments. Each will involve an individual written discussion based on a prompt and text, visual, and/or audio materials. These assignments are due on Friday of the week they are assigned. Responses should be uploaded to canvas. Each student must complete the assignment in their own words (see generative “AI” statement below); however, discussion with peers to brainstorm is allowed. See rubric on canvas for more information on completing these assignments.

Extra Credit:

There are three options for extra credit points. The final day to submit any of these activities and receive credit is April 24 at 5pm. Options: **(1)** If you set up a meeting/attend drop-in hours with Dr. Junker to discuss an exam during the semester, you will receive 1 bonus percentage. You can do this for up to 2% (i.e. 2 exams). We can discuss anything related to the exam during this time. **(2)** If you submit a list of three or more questions that came up for you during a lecture, you will receive 1 bonus percentage. You can do this activity for up to two lectures. Submitted questions should include a heading with your name, the date of the

lecture and topic, and a bulleted list of questions (minimum 3 questions). Although answers will not be provided back to you, this opportunity allows you to think critically about the course content and provides me with feedback about topics for which students need clarification. (3) You can attend a seminar in the Dept. of Biology *BioFrontiers* seminar series (Fridays 3pm) and submit a 2-paragraph summary of the seminar. You can do this activity for up to two seminars, resulting in 2%. See rubric on canvas for how to complete this option. **In total, you can receive up to 4% extra credit in total.**

INSTRUCTOR RESPONSE

Connect with me through email (james.junker@unt.edu) and/or by attending Drop-in hours. During busy times, my inbox becomes rather full, so if you contact me and do not receive a response within two business days, please send a follow up email. A gentle nudge is always appreciated.

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.

Lab and Field Safety: We will use chemical reagents in the lab. All students enrolled in Stream Ecology are required to follow safety procedures and guidelines in all activities requiring lifting, climbing, walking on slippery surfaces, using equipment and tools, handling chemical solutions and hot and cold products. Lab chemicals 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 footwear that can get wet, rain gear, and warm clothes. UNT has some chest waders in various sizes (some with holes) that will be available. I strongly encourage each student to acquire their 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 *hands-on* and with as many practical experiences as possible. There will be 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.

ADDITIONAL COURSE POLICIES

1. **My office is open to students.** If you cannot meet during my designated drop-in hours, contact me, we will find a time to meet either in-person or virtually. Drop-in hours are a time for individual students or groups to discuss class materials, questions, and exams. But also, **you do not need a specific question.** Drop-in hours can also be used to discuss research ideas or opportunities, careers in ecology, etc.
If you have any problems with the course, 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 the required coursework.
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.
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. Writing assignments in the laboratory and lecture will require original literature research; plagiarism (copying and pasting from scientific works or internet resources without proper citations) is considered cheating. See generative "AI" policy below.
4. **Policy on the use of generative "AI":** The classroom is a space for learning and practicing writing, researching, and creative processes. Generative large language models (LLMs, often disingenuously called "artificial intelligence" or "AI"), such as ChatGPT, Claude, and Gemini, etc. do not align with our goal of fostering your independent thinking. This is because generative LLMs diminish opportunities to learn from our experiences, express our creative freedoms, problem solve, and contribute our ideas in

authentic ways. The classroom is a place for learning, and we should not relinquish this opportunity to machines. As such, it is expected that all work submitted by students, individually or as a group, is their own.

Drop Information: If you decide to drop the class, ALL EQUIPMENT assigned to you (collecting and insect preparation materials) **MUST** be returned to the lab instructor. There are no exceptions to this policy. Failure to turn in equipment is CONSIDERED THEFT OF UNIVERSITY PROPERTY

ACCEPTABLE STUDENT BEHAVIOR Student behavior that interferes with an instructor's ability to conduct a class or other students' learning opportunities is unacceptable and disruptive and will not be tolerated in any instructional forum at UNT. Students engaging in inappropriate behavior will be directed to leave the classroom. The instructor may refer the student to the Center for Student Rights and Responsibilities to consider whether the student's conduct violated the Code of Student Conduct. The University's expectations for student conduct apply to all instructional forums, including University and electronic classrooms, labs, discussion groups, field trips, etc. The Code of Student Conduct can be found at <https://policy.unt.edu/policy/07-012>

It is expected that student behavior will be courteous to the course instructors and other students. Students should arrive for class early and leave only at the end. On those days that you must arrive late, **please quietly enter the classroom and do not disrupt the class during your entrance.** If you missed the handouts, **please wait** until the end of the class to receive them.

Cell phones must be turned off during class. This course is taught in a small classroom texting and surfing the internet distracts the instructor and students. Students violating such norms will be asked and expected to leave the classroom.

Students cannot video or audio record lectures or laboratory presentations unless granted permission. Even if a student has special permission to audio record, this information MUST be deleted at the end of the semester.

SEXUAL DISCRIMINATION, HARASSMENT, & ASSAULT

UNT is committed to providing an environment₁₂ free of all forms of discrimination

and sexual harassment, including sexual assault, domestic violence, dating violence, and stalking. If you (or someone you know) has experienced or experiences any of these acts of aggression, please know that you are not alone. The federal Title IX law makes it clear that violence and harassment based on sex and gender are Civil Rights offenses. UNT has staff members trained to support you in navigating campus life, accessing health and counseling services, providing academic and housing accommodations, helping with legal protective orders, and more. UNT's Dean of Students' website offers a range of on-campus and off-campus resources to help support survivors, depending on their needs. A summary of Student Resources for Sexual Assault, Sexual Misconduct, Relationship Violence, and Stalking can be found at <https://studentaffairs.unt.edu/dean-of-students>

Disability Accommodation: The University of North Texas makes reasonable accommodations for students with disabilities. To request accommodations, you must first register with the Office of Disability Access (ODA) by completing an application for services and providing documentation to verify your eligibility each semester. Once your eligibility is confirmed, you may request your letter of accommodation. ODA will then email your faculty a letter of reasonable accommodation, initiating a private discussion about your specific needs in the course.

You can request accommodations at any time, but it's important to provide ODA notice to your faculty as early as possible in the semester to avoid delays in implementation. Keep in mind that you must obtain a new letter of accommodation for each semester and meet with each faculty member before accommodations can be implemented in each class. You are strongly encouraged to meet with faculty regarding your accommodations during office hours or by appointment. Faculty have the authority to ask you to discuss your letter during their designated office hours to protect your privacy. For more information and to access resources that can support your needs, refer to the Office of Disability Access website (<https://studentaffairs.unt.edu/office-disability-access>).

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>)
- Counseling and Testing Services
(<https://studentaffairs.unt.edu/counseling-and-testing-services>)
- UNT Care Team (<https://studentaffairs.unt.edu/care>)
- UNT Psychiatric Services
(<https://studentaffairs.unt.edu/student-health-and-wellness-center/services/psychiatry>)
- 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 instructors know.

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>)
- Financial Aid (<https://financialaid.unt.edu/>)
- Student Legal Services (<https://studentaffairs.unt.edu/student-legal-services>)
- Career Center (<https://studentaffairs.unt.edu/career-center>)
- Center for Belonging & Engagement (<https://aux--studentaffairs.unt.edu/eagle-engagement-center/index.html>)

- Counseling and Testing Services (<https://studentaffairs.unt.edu/counseling-and-testing-services>)
- LGBTQ+ resources (<https://unt.campuslabs.com/engage/organization/glad>)
- UNT Food Pantry (<https://studentaffairs.unt.edu/desresources/programs/food-pantry/index.html>)

Academic Support Services

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