

## LAKE ECOLOGY (BIOL G4463)

Spring 2025

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Office hrs: by appointment

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**Meeting time & Place:** Class will meet twice weekly on Tuesdays and Thursdays from 10:30-11:45 in Richards Hall, Room 304. Lab will meet weekly on Tuesdays from 1:30-4:20 in PHSC 219N.

**Other important dates to note:** 20 Feb: Exam 1 is due; 01 Apr: Exam 2 is due; 07 May: Exam 3 is due.

**Course Objective:** To provide students with a broad overview of the field of lake ecology (or more broadly, limnology, the study of inland waters) via classroom discussions based on readings from the primary literature and hands-on laboratory exercises.

### Course Goals:

- Help students develop an understanding and appreciation of lake ecosystems, focusing on major abiotic and biotic components and their ecological interactions
- Introduce students to the basic and applied ecology of lake ecosystems
- Introduce students to the key scientific approaches used to study and manage lake ecosystems
- Introduce students to major scientific papers in the fields of freshwater ecology and limnology

**Text:** Readings will be assigned from a variety of limnological texts and research journals and are posted in pdf form in Canvas for this course.

### Grading policy:

Reading Outlines/Quizzes	10%	Exam 1	15%
Class Participation	15%	Exam 2	15%
Lab assignments/reports/project	30%	Exam 3	15%

**Participation:** Students will be expected to come to class prepared, having completed the assigned readings and assignments and to participate actively in classroom discussions. Classroom participation will constitute 25% of the course grade, through a combination of assignments and occasional quizzes (10%), and participation in classroom discussion (15%). Each day of lecture, students will be required to hand in a brief written summary or outline of the day's reading.

**Use of technology in class is encouraged, particularly as it pertains to reducing the use of paper, and ultimately water. However, use of electronic social media (email, Facebook, etc.) during class will negatively affect your grade.**

**Attendance is mandatory.** Students are responsible for the content of this course. Students have a responsibility to inform me prior to absences whenever possible. I will make every effort to find a reasonable accommodation for students who miss class, particularly as a result of participation in Provost-approved or Director-of-Athletics approved University-sponsored activities or legally required activities such as emergency military service or jury duty. Regardless of reason for absence, students are responsible for making up all missed material.

### Graduate credit:

Lake Ecology (BIOL G4463) is approved for graduate credit. **If an undergraduate student wishes to receive graduate credit for the course, the student must declare so in the graduate college within the first two weeks of the semester.**

**Land Acknowledgement Statement Provided by OU's Tribal Liaison office:**

Long before the University of Oklahoma was established, the land on which the University now resides was the traditional home of the "Hasinai" Caddo Nation and "[Kiriiki?i:s](#)" Wichita & Affiliated Tribes.

We acknowledge this territory once also served as a hunting ground, trade exchange point, and migration route for the Apache, Comanche, Kiowa and Osage nations. Today, 39 tribal nations dwell in the state of Oklahoma as a result of settler and colonial policies that were designed to assimilate Native people. The University of Oklahoma recognizes the historical connection our university has with its indigenous community. We acknowledge, honor and respect the diverse Indigenous peoples connected to this land. We fully recognize, support and advocate for the sovereign rights of all of Oklahoma's 39 tribal nations. This acknowledgement is aligned with our university's core value of creating a diverse and inclusive community. It is an institutional responsibility to recognize and acknowledge the people, culture and history that make up our entire OU Community.

**Inclusion Statement:**

I believe strongly in our capacity to learn when given the appropriate support and resources. While we may enjoy learning, sometimes learning can be uncomfortable. Learning can cause discomfort because the subject matter may cause us to wonder whether or not we know enough to be here, or it may call into question things we thought we knew or were really good at. Simply put, the more we learn, the less we know. I am here to affirm that it is okay that you do not know everything already, as that is why you are here: to learn. If you do not feel adequately prepared for a topic, please connect with Chris or me. We will provide you with additional resources so that you can review material and feel more confident in the material that we are covering in class.

It is also important to me that I be transparent with you—learning is a process. For me, this means acknowledging when I don't know something or when I am wrong. I too am always learning. If someone in class does not know the correct answer or how to answer using the appropriate limnological terminology, I will do my best to reframe the question asked, or to turn to one of your colleagues for assistance, so that we may have a productive learning experience. I hope to foster a collaborative learning environment where everyone can support one another in academic growth.

I also recognize that sometimes additional support can be necessary. For students who are experiencing issues outside of the classroom that may be impacting their ability to focus on their educational experience, such as bias, gender-based violence, financial concerns, etc., in addition to the resources listed elsewhere in the syllabus, such as counseling, I would like to encourage you to connect with and utilize the following resources as appropriate:

- [Compass Network](#) – You can self-refer to this network of support, which will get you connected to someone who can help you consider how to navigate a range of personal challenges.
- [Gender + Equality Center](#) – The Gender + Equality Center houses OU Advocates, which serves folk impacted by gender-based violence who are members of the OU campus community. It also houses LGBTQ+ programs to help build awareness, education and community.
- [International Student Services](#) – International students may connect with their advisor or the range of programs and events that will help build community.
- [Multicultural Programs and Services](#) – These programs are open to everyone and may be of particular interest for folk looking for community around diversity and inclusion, as well as cultural, intercultural, and heritage celebrations.
- [OU Food Pantry](#) – All you need is an OU ID to access the food pantry, which provides free food, clothing, menstrual products, and books. Please visit their website to stay up to date with their open hours and location.
- [Project Threshold](#) – If you are a first generation college student, economically disadvantaged (per federal guidelines) or disabled (with appropriate documentation), you may benefit from connecting with Project Threshold for advising or tutoring.
- [Veteran Support Alliance](#) – If you are active military, veteran, or military service-connected, the Veteran Support Alliance has information about resources and support to help you be successful.
- [24-Hour Reporting Hotline](#) – If you are experiencing, have experienced, or witnessed bias, discrimination, or harassment, please notify the university. You may also file a report through an [online form with Institutional Equity](#).

## UNIVERSITY POLICIES

### OU Reasonable Accommodation Policy:

The Accessibility and Disability Resource Center is committed to supporting students with disabilities to ensure that they are able to enjoy equal access to all components of their education. This includes your academics, housing, and community events. If you are experiencing a disability, a mental/medical health condition that has a significant impact on one or more life functions, you can receive accommodations to provide equal access. Possible disabilities include, but are not limited to, learning disabilities, AD(H)D, mental health, and chronic health. Additionally, we support students with temporary medical conditions (broken wrist, shoulder surgery, etc.) and pregnancy. To discuss potential accommodations, please contact the ADRC at 730 College Avenue, (ph.) 405.325.3852, or [adrc@ou.edu](mailto:adrc@ou.edu).

### Academic misconduct:

I follow the University's policies on academic misconduct and I expect you to be familiar with these policies (<http://integrity.ou.edu>). Unless otherwise specified (group discussions/projects, for example), the work you turn in must be yours and yours alone. I expect you to provide citations of sources you use in all assignments. I will report any cases of cheating, plagiarism, and improper collaboration. Sanctions for academic misconduct can include expulsion from the University or an F in this course, so please take this seriously. If you have questions about properly citing sources, paraphrasing from those sources, or other aspects related to these issues please don't hesitate to contact me or the OU Writing Center. If you have questions about appropriate collaboration with group members, again, please ask me.

### Final Exam Preparation Period (required)

Pre-finals week will be defined as the seven calendar days before the first day of finals. Faculty may cover new course material throughout this week. For specific provisions of the policy please refer to OU's [Final Exam Preparation Period policy](#).

### Religious observances:

It is the policy of the University to excuse the absences of students that result from religious observances and to reschedule examinations and additional required classwork that may fall on religious holidays, without penalty.

### Adjustments for Pregnancy/Childbirth Related Issues:

Should you need modifications or adjustments to your course requirements because of documented pregnancy-related or childbirth-related issues, please contact your professor or the Accessibility and Disability Resource Center at 405/325-3852 as soon as possible. Also, see the Institutional Equity Office [FAQ on Pregnant and Parenting Students' Rights](#) for answers to commonly asked questions.

### Title IX Resources and Reporting Requirement:

Anyone who has been impacted by gender-based violence, including dating violence, domestic violence, stalking, harassment, and sexual assault, deserves access to resources so that they are supported personally and academically. The University of Oklahoma is committed to offering resources to those impacted, including: speaking with someone confidentially about your options, medical attention, counseling, reporting, academic support, and safety plans. If you would like to speak with someone confidentially, please contact [OU Advocates](#) (available 24/7 at 405-615-0013) or another confidential resource (see ["Can I make an anonymous report?"](#)). You may also choose to report gender-based violence and discrimination through other means, including by contacting the [Institutional Equity Office](#) ([ieo@ou.edu](mailto:ieo@ou.edu), 405-325-3546) or police (911). Because the University of Oklahoma is committed to the safety of you and other students, I, as well as other faculty, Graduate Assistants, and Teaching Assistants, are mandatory reporters. This means that we are obligated to report gender-based violence that has been disclosed to us to the Institutional Equity Office. This includes disclosures that occur in: class discussion, writing assignments, discussion boards, emails and during Student/Office Hours. For more information, please visit the [Institutional Equity Office](#).

### Emergency Protocol

During an emergency, there are official university procedures that will maximize your safety.

**Severe Weather:** If you receive an OU Alert to seek refuge or hear a tornado siren that signals severe weather.

1. Look for severe weather refuge location maps located inside most OU buildings near the entrances

2. Seek refuge inside a building. Do not leave one building to seek shelter in another building that you deem safer. If outside, get into the nearest building.
3. Go to the building's severe weather refuge location. If you do not know where that is, go to the lowest level possible and seek refuge in an innermost room. Avoid outside doors and windows.
4. Get in, Get Down, Cover Up
5. Wait for official notice to resume normal activities.

Additional [Weather Safety Information](#) is available through the Department of Campus Safety.

#### **Armed Subject/Campus Intruder:**

If you receive an OU Alert to shelter-in-place due to an active shooter or armed intruder situation or you hear what you perceive to be gunshots:

1. Avoid: If you believe you can get out of the area WITHOUT encountering the armed individual, move quickly towards the nearest building exit, move away from the building, and call 911.
2. Deny: If you cannot flee, move to an area that can be locked or barricaded, turn off lights, silence devices, spread out, and formulate a plan of attack if the shooter enters the room.
3. Defend: As a last resort fight to defend yourself.

For more information, visit [OU's Active Shooter page](#) and the [Shots Fired on Campus Procedure - Video](#).

#### **Fire Alarm/General Emergency:**

If you receive an OU Alert that there is danger inside or near the building, or the fire alarm inside the building activates:

1. *LEAVE* the building. Do not use the elevators.
2. *KNOW* at least two building exits
3. *ASSIST* those that may need help
4. *PROCEED* to the emergency assembly area
5. *ONCE safely outside, NOTIFY first responders of anyone that may still be inside building due to mobility issues.*
6. *WAIT* for official notice before attempting to re-enter the building.

[OU Fire Safety on Campus](#)

#### **Mental Health Support Services**

If you are experiencing any mental health issues that are impacting your academic performance, counseling is available at the University Counseling Center (UCC). The Center is located on the second floor of the Goddard Health Center, at 620 Elm Rm. 201, Norman, OK 73019. To schedule an appointment call (405) 325-2911. For more information, please visit [University Counseling Center](#).

***Lake Ecology: Tentative Syllabus (subject to change)***

Date	Day	Lecture Topic	Required Reading
14-Jan	T	1. Limnology: Introduction & Brief History	Kalff (2002), Ch 2; Cole and Weihe (2016), Ch 5
14-Jan	T	No lab	--
16-Jan	R	2. Origin of lakes (lake formation & morphometry)	Cole and Weihe (2016), Ch 5
21-Jan	T	3. Light, heat, and stratification	Cole and Weihe (2016), Ch 9–10
21-Jan	T	Lab 1: Lake origin/morphometry	Cole and Weihe (2016), Ch 6
23-Jan	R	4. Lake Classification and Oxygen	Cole & Weihe (2016), Ch 12; Cornett & Rigler (1979)
28-Jan	T	5. Nitrogen and Phosphorus	Cole & Weihe (2016), pp. 349-362
28-Jan	T	Lab 2: Lake Stratification	Lake Stratification and Mixing Handout
30-Jan	R	6. Phytoplankton Diversity	Dodds and Whiles (2010), pp. 191-208
4-Feb	T	7. Phytoplankton Nutrient Limitation	Schindler (1974), Elser et al. (1990)
4-Feb	T	Lab 3: Limiting nutrients in algal growth experiment (design and data collection)	--
6-Feb	R	8. Nutrients and predicting phytoplankton biomass	Dillon & Rigler (1974), McCauley et al. (1989)
11-Feb	T	9. Nutrients and phytoplankton composition	Smith (1983), Downing et al. (2001)
11-Feb	T	Lab 4: Limiting nutrients in algal growth experiment (data analysis)	
<b>13-Feb</b>	<b>R</b>	<b>10. Review for Exam 1 Exam 1 available (Due 20 Feb)</b>	--
18-Feb	T	11. Zooplankton Diversity	Dodson (2005), Ch 4
18-Feb	T	Lab 5: Microscopy of phytoplankton and zooplankton samples	Lind Phytoplankton Enumeration
20-Feb	R	12. Zooplankton grazing and nutrient mineralization	Burns (1968), Hambright et al. (2007)
25-Feb	T	13. Herbivorous zooplankton and phytoplankton	Mazumder & Havens (1998), Sommer et al. (2001)
25-Feb	T	Lab 6: Zooplankton grazing and life history experiment (set-up)	--
27-Feb	R	14. Predatory zooplankton	Gilbert (1966), Neill (1990)
4-Mar	T	15. Competition and predation in zooplankton: planktivorous fish	Brooks & Dodson (1965), Hurlbert et al. (1972)
4-Mar	T	Lab 7: Zooplankton grazing and life history experiment	--
6-Mar	R	16. Microbial consumers and the microbial loop	Carrick et al. (1991), Porter (1996), Hambright et al. (2007)

11-Mar	T	17. Top-down and bottom-up regulation of plankton	Mazumder (1994), Brett & Goldman (1997)
11-Mar	T	Lab 8: Field Sampling at Lake Thunderbird	--
13-Mar	R	18. Piscivorous fish and trophic cascades	Zaret & Paine (1973), Carpenter et al. (1985), Drenner & Hambright (2002)
18-Mar	T	No Class – Spring Break	--
18-Mar	T	No Lab – Spring Break	--
20-Mar	R	No Class – Spring Break	--
25-Mar	T	19. Review for Exam 2 Exam 2 available (due 1 Apr)	--
25-Mar	T	Lab 9. Predation (set-up)	--
27-Mar	R	No class	--
1-Apr	T	20. Eutrophication & Lake Washington	Edmondson (1970)
1-Apr	T	Lab 10: Predation (analysis)	--
3-Apr	R	21. Anthropogenic/climate change	Jackson et al. (2001); Zou et al. (2017, 2019)
8-Apr	T	22. Climate change & Lakes	Jane et al. (2021), Knoll et al. (2019)
8-Apr	T	Lab 11: Field trip: Norman Wastewater treatment facility	--
10-Apr	R	23. Harmful algal blooms: Cyanobacteria (Chris)	Paerl et al. (2016)
15-Apr	T	24. Winter Limnology (Rebecca North)	Reinl et al. (2023)
15-Apr	T	Lab 12: Cyanobacteria	--
17-Apr	R	25. Harmful algal blooms: Golden algae	Rommel et al. (2011), Rommel & Hambright (2012)
22-Apr	T	26. Invasive Species	Johnson et al. (2008)
22-Apr	T	Lab 14 Cyanobacteria – Introduction to bioinformatics	--
24-Apr	R	27. Killer Lakes	Kling et al. (1987), Kling et al. (2005)
29 Apr	T	Lab 15: Bioinformatics 2	--
29-Apr	T	28. Paleolimnology / Resurrection ecology	Kitchell & Kitchell (1980), Hairston et al. (1999)
1-May	R	29. Review for Exam 3 Exam 3 available (due 7 May)	--
7-May	R	Exam 3 due	8-10 AM