

FAS 6275 online

Freshwater Ecology, 3 credit hours

Prerequisites: none

Professor: Dr. Lindsey Reisinger

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Office hours via Zoom Tuesday 12:00 - 2:00 pm (<https://ufl.zoom.us/j/98700865323>)

Text: Dodds, W.K. and M. R. Whiles. 2019. Freshwater ecology: concepts and environmental applications of limnology. 3rd edition. Elsevier, San Diego, CA.

Or

Dodds, W.K. 2002. Freshwater ecology: concepts and environmental applications of limnology. 1st edition. Elsevier, San Diego, CA. (available as an E Book through the UF George A. Smathers Libraries)

Additional papers from the primary literature will be assigned throughout the semester.

Course Description:

This course is designed to provide students with an understanding of the concepts in freshwater ecology that are important for controlling the traits, distribution, and abundance of aquatic organisms. Material will focus on the major groups of organisms found in freshwater habitats, the physical and chemical properties that are important for structuring freshwater communities, and the ecological processes that affect freshwater communities and ecosystems.

The class will be structured as a combination of recorded online lectures and asynchronous online group discussions. Weekly readings will typically consist of a portion of the text from Dodds and Whiles as well as one scientific paper. There will also typically be two types of online discussions each week, one focused on review questions and one focused on a scientific paper. On the review questions board, the instructor will post questions designed to help students review and apply the course material. Students will discuss the assigned scientific paper for the week by commenting and responding to comments using Perusall. Students will also submit a written summary of each scientific paper.

Student Learning Outcomes:

At the end of the course, students will be able to:

- Identify the principal physical and chemical aspects of freshwater ecosystems and explain how they structure freshwater communities
- Describe common groups of freshwater organisms and the main ways that they interact with one another
- Explain the major ways in which human activities affect freshwater ecosystems and the organisms that live in them
- Predict the effects of freshwater organisms and ecological processes across a variety of conditions
- Consider the strengths and weaknesses of scientific papers focused on freshwater ecology research and examine how they contribute to broader topics
- Produce a presentation that critically evaluates a freshwater ecology paper of your choosing
- Propose new experiments to build on existing knowledge in the field of freshwater ecology

Graded work:

A more detailed description and a grading rubric for each assignment will be provided in the class.

Exams, quizzes, and In-class activities

There will be two exams over the course of the semester as well as a final exam. Each exam will be cumulative and cover new material as well as material from earlier in the semester. Later exams contribute more to the grade than early exams. Graduate students will answer an additional essay question on each exam that focuses on drawing connections among the scientific papers and other

course content or proposing new experiments to build on existing knowledge. The instructor will provide a set of learning objectives covered by each exam that can be used as a study guide. The discussion board activities will provide an opportunity for students to practice answering questions similar to those that will appear on the exams. In addition to exams and discussions, there will be a quiz focused on identifying freshwater animals and their ecological roles.

Evaluation of scientific literature

Several assignments are designed to encourage critical evaluation of scientific data and methods in freshwater ecology. Throughout the semester, the class will read scientific papers and post about the papers using Perusall. After discussing the scientific paper using Perusall, students will turn in a summary (1 page or less) that includes the strengths and weaknesses of the research and suggests new methods that could be used to improve our knowledge of the topic. Graduate students will also create a presentation that expands on one of the weekly discussion topics. This will be a conference-style presentation that focuses on a scientific paper (chosen by the student) that is related to the scientific paper we will discuss in class.

Attendance and Participation

Class participation is an essential part of the class. Students can participate by contributing to discussions of the scientific papers using Perusall (this is 10% of the final grade). Students can also contribute to the lecture review questions weekly discussion boards, which will help students prepare for the questions that will be asked on exams.

Submitting Assignments

Assignments are expected to be turned in on time, and the due dates are designed to prevent a substantial amount of work from piling up. I will accept late assignments up until the date of the next exam or before of the last day of class (December 4), whichever comes first. For example, if an assignment was due the first week of class, it would not be accepted after the date of the first exam. Likewise, if an assignment was due in week 10, it would not be accepted after the date of the second exam.

Students are expected to take exams and quizzes on the assigned date. If you must miss an exam or quiz on the date it is assigned due to an absence that meets the University criteria for "excused," please email the instructor as soon as possible to reschedule.

Assignments will be submitted online on the UF Canvas E-Learning site. A computer with internet connection is required. The UF Canvas E-Learning site can be accessed at <http://elearning.ufl.edu/> using your Gatorlink account. Please contact the computing help desk with questions <https://helpdesk.ufl.edu/>. You can find the recorded lectures, readings, and assignments for each week in the Modules section.

Evaluation of Student Learning: [Click here to see the university grades and grading policies](#)

Assignment	Percent of Grade
Quiz	3%
Scientific paper summaries	10%
Reading engagement	15%
Presentation	15%
Exam 1	12%
Exam 2	20%
Final Exam	25%
TOTAL	100%

A 94-100%; A- 90-93;
 B+ 86-89; B 83-85; B- 80-82;
 C+ 76-79; C 73-75; C- 70-72;
 D+ 66-69; D 63-65; D- 60-62;
 E <60%

Final grades will not be bumped up or down to any extent to result in a different letter grade. Your grade will be based on the score you earned on each of these assignments (nothing more and nothing less).

Schedule of Class Topics		
Week 1	Topics	The importance of freshwater ecosystems Physical and chemical properties of water and the influence of water properties on aquatic organisms
	Readings/Works	Dodds and Whiles chapters 1 and 2 Dodds and Whiles appendix: experimental design in aquatic ecology
Week 2 (Labor Day)	Topics	Movement of light, heat, and chemicals in water The hydrologic cycle, groundwater, and its connection to surface water
	Readings/Works	Dodds and Whiles chapters 3 and 4 Meijer et al. 2021
Week 3	Topics	Wetland habitats, adaptations of wetland organisms, human impacts on wetland ecosystems Flowing waters, human impacts on flowing water ecosystems
	Readings/Works	Dodds and Whiles chapters 5 and 6 (chapter 5 in 1 st edition) Moore and Palmer 2005
Week 4	Topics	Lakes and reservoirs, lake formation processes and biodiversity, stratification
	Readings/Works	Dodds and Whiles chapter 7 (chapter 6 in 1 st edition) Craig et al. 2015
Week 5	Topics	Classification of freshwater organisms Freshwater microbes
	Readings/Works	Dodds and Whiles chapters 8 and 9 (chapters 7 and 8 in 1 st edition) Simon et al. 2017
Week 6	Monday Sept 30	Exam review 3 pm via Zoom (optional)
	Wednesday Oct 2	Exam 1
	Topics	Freshwater animals
	Readings/Works	Dodds and Whiles chapter 10 (chapter 9 in 1 st edition)
Week 7	Topics	Chemicals in freshwater ecosystems, drivers of dissolved oxygen concentrations including photosynthesis and respiration Carbon cycling, leaf litter breakdown
	Readings/Works	Dodds and Whiles chapters 12 and 13 (chapters 11 and 12 in 1 st edition) Climate change podcast Low-Decarie et al. 2015

Schedule of Class Topics		
Week 8	Wednesday Oct 16	Freshwater animals quiz
	Topics	Nutrients and their cycles Nutrient use and remineralization by aquatic organisms
	Readings/Works	Dodds and Whiles chapters 14 and 17 (chapters 13 and 16 in 1 st edition) Schindler 1974 Elser et al. 2010
Week 9	Topics	Freshwater plants Evolution and biodiversity
	Readings/Works	Dodds and Whiles chapter 11 (chapter 10 in 1 st edition) Pond plants video with Dr. Cichra Cardinale 2011
Week 10	Topics	Biological invasions Ecosystem ecology
	Readings/Works	Dodds and Whiles chapter 24 (chapter 22 in 1 st edition) Ricciardi & Rasmussen 1999 Wilson et al. 2004
Week 11	Monday Nov 4	Exam review 3 pm via Zoom (optional)
	Wednesday Nov 6	Exam 2
	Topics	Chemicals and pollutants
	Readings/Works	Dodds and Whiles chapter 16 (chapter 14 in 1 st edition)
Week 12	Topics	Trophic state and eutrophication Predation and trophic cascades
	Readings/Works	Dodds and Whiles chapters 18 and 20 (chapters 17 and 19 in 1 st edition) Rosi et al. 2018
Week 13	Topics	Microbes: behavior and interactions Parasitism, competition, and mutualism
	Readings/Works	Dodds and Whiles chapters 19 and 21 (chapters 18 and 20 in 1 st edition) Hintz et al. 2017
Thanksgiving Week		
Week 14	Topics	Fish ecology and fisheries Complex community interactions
	Readings/Works	Dodds and Whiles chapter 22 and 23 (chapter 21 in 1 st edition, one of these chapters is absent from 1 st edition) Sass et al. 2006
Exam Week	Friday Dec 13	Final Exam

Primary Literature

Reading discussion 1 (water availability)

Meijer, C. G., H. J. Warburton, and A. R. McIntosh. 2021. Disentangling the multiple effects of stream drying and riparian canopy cover on the trophic ecology of a highly threatened fish. *Freshwater Biology* 66:102-113.

Reading discussion 2 (land use):

Moore, A. A., and M. A. Palmer. 2005. Invertebrate biodiversity in agricultural and urban headwater streams: implications for conservation and management. *Ecological Applications* 15:1169–1177.

Reading discussion 3 (dissolved organic carbon):

Craig, N., S. E. Jones, B. C. Weidel, and C. T. Solomon. 2015. Habitat, not resource availability, limits consumer production in lake ecosystems. *Limnology and Oceanography* 60:2079-2089.

Reading discussion 4 (eco-evolutionary dynamics):

Simon, T. N., R. D. Bassar, A. J. Binderup, A. S. Flecker, M. C. Freeman, J. F. Gilliam, M. C. Marshall, S. A. Thomas, J. Travis, D. N. Reznick, and C. M. Pringle. 2017. Local adaptation in Trinidadian guppies

alters stream ecosystem structure at landscape scales despite high environmental variability. *Copeia*, 105(3), 504-513.

Reading discussion 5 (climate change):

Low-Decarie, E., G. Bell, and G. F. Fussmann. 2015. CO₂ alters community composition and response to nutrient enrichment of freshwater phytoplankton. *Oecologia* 177:875-883.

Reading discussion 6 (nutrient pollution, stoichiometry):

Elser, J. J., A. L. Peace, M. Kyle, M. Wojewodzic, M. L. McCrackin, T. Andersen, and D. O. Hessen. 2010. Atmospheric nitrogen deposition is associated with elevated phosphorus limitation of lake zooplankton. *Ecology Letters* 13:1256–1261.

Schindler, D. W. 1974. Eutrophication and recovery in experimental lakes: implications for lake management. *Science* 184:897–899. (additional reading – not the focus of the discussion)

Reading discussion 7 (biodiversity and ecosystem function):

Cardinale, B. J. 2011. Biodiversity improves water quality through niche partitioning. *Nature* 472:86–91.

Reading discussion 8 (extinctions, biological invasions):

Wilson, K. A., J. J. Magnuson, D. M. Lodge, A. M. Hill, T. K. Kratz, W. L. Perry, and T. V. Willis. 2004. A long-term rusty crayfish (*Orconectes rusticus*) invasion: dispersal patterns and community change in a north temperate lake. *Canadian Journal of Fisheries and Aquatic Sciences* 61:2255–2266.

Ricciardi, A., and J. B. Rasmussen. 1999. Extinction rates of North American freshwater fauna. *Conservation Biology* 13:1220–1222. (additional reading – not the focus of the discussion)

Reading discussion 9 (pharmaceuticals):

Rosi, E. J., H. A. Bechtold, D. Snow, M. Rojas, A. J. Reisinger, and J. J. Kelly. 2018. Urban stream microbial communities show resistance to pharmaceutical exposure. *Ecosphere* 9:e02041.

Reading discussion 10 (trophic cascades):

Hintz, W. D., B. M. Mattes, M. S. Schuler, D. K. Jones, A. B. Stoler, L. Lind, and R. A. Relyea. 2017. Salinization triggers a trophic cascade in experimental freshwater communities with varying food-chain length. *Ecological Applications*, 27(3), 833-844.

Reading discussion 11 (fish ecology):

Sass, G. G., J. F. Kitchell, S. R. Carpenter, T. R. Hrabik, A. E. Marburg, and M. G. Turner. 2006. Fish community and food web responses to a whole-lake removal of coarse woody habitat. *Fisheries* 31:321–330.

Policies and Requirements

This course plan and syllabus are subject to change in response to student and instructor needs. Any changes will be clearly communicated in advance through Canvas.

Attendance, Late Submissions & Make-up Requests

It is the responsibility of the student to access on-line lectures, readings, quizzes, and exams and to maintain satisfactory progress in the course. Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

Computer or other hardware failures, except failure of the UF e-Learning system, will not excuse students for missing assignments. Any late submissions due to technical issues MUST be accompanied by the ticket number received from the Helpdesk when the problem was reported to them. The ticket number will document the time and date of the problem. You MUST e-mail your instructor within 24 hours of the technical difficulty if you wish to request consideration.

For computer, software compatibility, or access problems call the HELP DESK phone number—352-392-HELP = 352- 392-4357 (option 2).

Communication Courtesy and Professionalism

Just as in any professional environment, meaningful and constructive dialogue is expected in this class and requires a degree of mutual respect, willingness to listen, and tolerance of opposing points of view. Respect for individual differences and alternative viewpoints will be maintained in this class at all times. All members of the class are expected to follow rules of common courtesy, decency, and civility in all interactions. Failure to do so will not be tolerated and may result in loss of participation points and/or referral to the Dean of Students' Office.

Semester Evaluation Process

Student assessment of instruction is an important part of efforts to improve teaching and learning.

At approximately the mid-point of the semester, the School of Forest, Fisheries, & Geomatics Sciences will request anonymous feedback on student satisfaction on various aspects of this course. These surveys will be sent out through Canvas and are not required but encouraged. This is not the UF Faculty Evaluation!

At the end of the semester, students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

Academic Honesty Policy

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity."

You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct or appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated.

Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: <http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code>.

Inclusive Learning Environment

This course embraces the University of Florida's Non-Discrimination Policy, which reads, The University shall actively promote equal opportunity policies and practices conforming to laws against discrimination. The University is committed to non-discrimination with respect to race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information and veteran status as protected under the Vietnam Era Veterans' Readjustment Assistance Act.

If you have questions or concerns about your rights and responsibilities for inclusive learning environment, please see the instructor or refer to the Office of Multicultural & Diversity Affairs website: <http://multicultural.ufl.edu> .

Services for Students with Disabilities:

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation. 0001 Reid Hall, 352-392-8565, disability.ufl.edu

Software Use

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

Campus Helping Resources

For issues with technical difficulties for e-learning in Canvas, please post your question to the Technical Help Discussion in your course, or contact the UF Help Desk at:

- Learning-support@ufl.edu | (352) 392-HELP - select option 2 | <http://elearning.ufl.edu>
- Library Help Desk support <http://cms.uflib.ufl.edu/ask>
- SFFGS Academic Hub <https://ufl.instructure.com/courses/303721>

Student Life, Wellness, and Counseling Help

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

- Counseling and Wellness resources <http://www.counseling.ufl.edu/cwc/>
- U Matter, We Care <http://www.umatter.ufl.edu/>
- Career Connections Center <http://career.ufl.edu/>
- Other resources are available at <http://www.distance.ufl.edu/getting-help> for online students.

Student Complaint Process

The School of Forest, Fisheries, & Geomatics Sciences cares about your experience and we will make every effort to address course concerns. We request that our online students complete a course satisfaction survey each semester, which is a time for you to voice your thoughts on how your course is being delivered. You can also submit feedback anytime.

If you have a more urgent concern, your first point of contact should be the Academic Coordinator or the Graduate/Undergraduate Coordinator for the program offering the course. You may also submit a complaint directly to UF administration:

- <https://distance.ufl.edu/getting-help/>
- <https://registrar.ufl.edu/complaint.html>

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