Course Outline: Winter 2026

General Information

Course Code: ENVS 3150

Course Title: Aquatic Systems

Course Description: In this course students will be taught how to apply quantitative methods to the analysis of aquatic systems of the earth from many simultaneous perspectives. The material will include the physical, chemical, and biological components of the various liquid surficial structures and processes and how they interact with humans. Economic, social and policy implications of humans interacting with aquatic systems will also be emphasized. The history of the analysis of aquatic systems will be systematically included in the material.

Credit Weight: 0.5

Academic Department (or campus): School of Environmental Sciences

Campus: Guelph

Semester Offering: Winter

Class Schedule and Location:

Lectures: Tuesdays and Thursdays, 1:00-2:20 in Rozanski Hall 105
Labs: Thursday (3:30-5:20) and Friday (12:30-2:20) in Graham Hall 3309

Note: Classes will be synchronous, live-streamed, and recorded

Instructor Information

Instructor Names: Paul Sibley & Neil Rooney
Instructor Emails: psibley@uoguelph.ca; nrooney@uoguelph.ca
Office location and office hours: By appointment (virtual or personal)

GTA Information

GTA Name: Joshua Lonuzzo
GTA Email: jlonuzzo@uoguelph.ca
GTA office location and office hours: Virtual at times TBD or by appointment.

Additional Information

- Please be sure to **check Courselink for information updates on a regular basis (daily is recommended)**.
- Zoom links for the labs and lectures are provided in Courselink under the Zoom tab.
- All lectures will be recorded for later asynchronous viewing; these will be posted to Courselink under the Recordings tab.

Course Content

Specific Learning Outcomes:

With respect to course material:

1) To gain foundational knowledge to understand the basic physiography, chemistry and biology/ecology of aquatic (freshwater and marine) systems.
2) To understand the science of aquatic systems in the context of management and policy principles and the essential link that must be established between these two elements in order to develop innovative and effective policies.
3) To understand 1 and 2 in the context of key global environmental issues presently facing humanity and how these issues have been or should be managed using sound science and policy.

With respect to scientific evaluation and effective communication:

4) To evaluate scientific evidence through critical evaluation of the literature and defense of ideas through discussion and debate.
5) To promote effective communication in an academic and professional environment through technical reports, discussions and debates.
6) To promote numeracy through problem solving (calculations) in lectures and statistical analysis of laboratory-generated data sets presented in laboratory reports.

Lecture Content:

Date (weeks of)	Instructor	Topic
January 6, 8, 13, 15 (4 lectures)	Sibley	Introductory concepts and basic principles in water chemistry, hydrology, and physiography
January 20, 22, 27, 29 (4 lectures)	Rooney	Dead lakes and dead zones: The science and management of nutrient pollution
February 3, 5, 10, 12 (4 lectures)	Sibley	When the switch goes off: Ocean acidification and the state of the world's oceans
Feb 16-20		Reading Week (no classes)

February 24, 26 March 3, 5 (4 lectures)	Rooney	Who killed the Grand Banks? The science and management of marine & freshwater fisheries
March 10, 12, 17, 19 (4 lectures)	Rooney	Concepts of Aquatic Biodiversity
March 24, 26, 31 April 2 (4 lectures)	Sibley	Aquatic Systems: The final repository for the by-products of Society

Laboratory Section (Course Assignments and Tests)

Assignment or Test	**Lab Date(s)**	**Due Date**	**% Final Mark**	**Learning Outcomes**
Labs Assignments				
Scientific method and report writing in 3150	Jan 15 (Th) and Jan 16 (F)	N/A	N/A	1-6
Nutrient Lab (Scientific Report)	Wk 1: Jan 22 (Th) / Jan 23 (F) Wk 2: Jan 29 (Th) / Jan 30 (F)	Feb 13	20%[1]	1, 5, 6
Ocean Acidification Lab (Critique)	Feb 5 (Th) / Feb 6 (F)	Mar 5 (Th) Mar 6 (F)	15%	1, 4, 5
Fisheries Lab (Media Piece)	Feb 26 (Th) / Feb 27 (F)	Mar 12 (Th) Mar 13 (F)	10%	2, 3, 5
Biodiversity Lab (Scientific Report)	Wk 1: Mar 5 (Th) / Mar 6 (F) Wk 2: Mar 12 (Th) /Mar 13 (F)	Mar 27	20%[1]	1, 5, 6
Toxicity Lab (Data Report)	Wk 1: Mar 19 (Th) /Mar 20 (F) Wk 2: Mar 26 (Th) /Mar 27 (F)	April 3	5%[1]	4-6
Lab Participation	All labs	End of semester	5%	1-6
Exams				
Mid-term	All material before midterm	Thursday, February 12	25%	1-6
Final Exam	All material after midterm	Thursday, April 16 (19:00-21:00)	25%	1-6

[1]See lab notes below.

Laboratory Notes:

1. Specific guidance on the format for writing the reports will be given (posted to CourseLink) ahead of each assignment.

2. All lab assignments will be submitted via Dropbox on Courselink unless otherwise specified. **Specific dates for assignment submissions are provided in the table above**. Experimental assignments (labs 2 (nutrient pollution), 5 (biodiversity), and 6 (toxicity)) are due on Fridays via Dropbox. All other assignments are due on the day of your respective labs, also via Dropbox.

3. Only one (1) of the two lab reports (eutrophication or biodiversity) must be written up (you can choose which one you would like to submit). You are welcome to write both labs and we will take the better mark of the two as your final grade for the scientific report lab component. Strategically, it is recommended that you write up the first one and decide on submission of the second depending on your performance in the first one.

4. Exams: ***Exams will be written in-person***. Both exams are worth 25%.

Seminars: N/A

Final examination date and time:

Thursday, April 16, 2026 (19:00-21:00). Location TBD.

Final exam weighting: 25%

Course Resources

Required Texts:

N/A

Recommended Texts:

Ecology of Aquatic Systems (Dobson and Frid 2009 [Oxford University Press] – see reference list below) is recommended but not required. All other materials will be posted on CourseLink as needed.

Price: $91.00 (Amazon.ca) [Note that Thriftbooks lists used copies of this book for as low as $17.99].

Lab Manual:

N/A

Other Resources:

N/A

Field Trips:

N/A

Additional Costs:
N/A

Course Policies

Grading Policies

Students are expected to meet all posted deadlines (provided in the table above). Assignments will be handed in to the course instructor/teaching assistant at the specified time (usually by the end of the lab period) on the due date, either through Courselink (Dropbox) or directly as a hardcopy before/after class, during lab, or at the office of the course instructor/TA. **Students will be assessed with a late penalty of 5% per day unless appropriate arrangements with valid evidence have been made with the course instructor.**

Course Policy on Group Work:

Some laboratory exercises will require students to work in groups. Although you will generate the data collectively, all students are expected to complete the associated laboratory (or any other) assignments individually (not as groups). Students who submit documents indicating collective (rather than individual) efforts will be considered to have plagiarized and will be dealt with according to the plagiarism statement (see "university statements" below).

Course Policy regarding use of electronic devices and recording of lectures:

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the written permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

University Statements

Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a

teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Graduate Calendar - Grounds for Academic Consideration
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions
https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml

Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses

https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Graduate Calendar - Registration Changes

https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml

Associate Diploma Calendar - Dropping Courses

https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml

Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to make a booking at least 14 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time.

For Guelph students, information can be found on the SAS website:

https://www.uoguelph.ca/sas

For Ridgetown students, information can be found on the Ridgetown SAS website:

https://www.ridgetownc.com/services/accessibilityservices.cfm

Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity, and it is the responsibility of all members of the University community-faculty, staff, and students-to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff, and students have the responsibility of supporting an environment that encourages academic integrity. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Use of Artificial Intelligence: The use of artificial intelligence (AI) in this course must align with academic integrity principles. Students are expected to complete their work independently and showcase their problem-solving abilities. Undeclared and/or unauthorized use of AI tools to produce coursework is considered a form of academic misconduct. Any misuse of AI tools, including submitting AI-generated work, may be considered academic misconduct. For specific guidelines on acceptable AI use in your course, please check with your instructor. Review the University of Guelph's Statement on Artificial Intelligence Systems, ChatGPT, and Academic Integrity for more information. (https://news.uoguelph.ca/2023/03/university-ofguelph-statement-on-artificial-intelligence-systems-chatgpt-academic-integrity/?method=load).

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who

are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Undergraduate Calendar - Academic Misconduct

https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

Graduate Calendar - Academic Misconduct

https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

Recording Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars
https://www.uoguelph.ca/academics/calendars

Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g., final exam or major assignment).

Useful Literature

Biology/Ecology/Chemistry

Allan, J.D. 1995. Stream Ecology. Chapman and Hall, New York. (Library: U. of G. - QH 541.5.S7 A44).

Allsop, M., Page, R., Johnston, P., and D. Santillo. 2009. State of the world's oceans. Springer, London. 256 pp.

De Ruiter, P.C., Wolters, V., Moore, J.C. 2005. Dynamic food webs: Multispecies assemblages, ecosystem development and environmental change. Academic Press, New York.590 pp.

Dobson, M. and C. Frid. 2009. Ecology of aquatic systems (Second Edition). Oxford University Press321 pp.

Dodds, W.K. 2002. Freshwater Ecology. Concepts and environmental applications. Acad Press, San Diego. 569 pp.

Gibert, J., Mathieu, J., and F. Fournier 1997. Groundwater-Surface Water Ecotones: Biological and Hydrological Interactions and Management Options. Intern. Hydrol. Ser. Cambridge University Press. 246 pp. (Library: U. of G. - QH541.5).

Giller, P.S. and B. Malmqvist 2002. The biology of streams and rivers. Oxford University Press. 296 pp. (Library: U. of G. - QH541.5.S7 GC5)

Giller, P.S., Hildrew, A.G., and D.G. Raffaelli 1994. Aquatic Ecology: Scale, pattern and process. Blackwell Sci Publications. 649 pp. [A somewhat advanced examination of aquatic ecology issues of all freshwater systems].

Hauer, F.R. and G.A Lamberti. Methods in Stream Ecology. Academic Press, New York. 674 pp. (Library: U. of G. - QH 541.5.S7 M47).
Hynes, H.B.N. 1970. The Ecology of Running Waters. Liverpool University Press, Liverpool. 555 pp. (Not in library system).
Jones, J.B. and P.J. Mullholand 2000. Streams and Groundwaters. Academic Press, New York. 425 pp. (Library: U. of G. - QH541.5.S7 S77).
Kaiser et al 2011. Marine Ecology. Processes, systems, and impacts. Oxford University Press. 501 pp.
Kandel, R. 2003. Water from heaven. Columbia University Press, New York. 312 pp.
Mitchell, A. 2009. Sea Sick. The global ocean in crisis. McLelland and Stewart, Toronto. 238 pp.
Naiman, R.J., Decamps, H., McClan, M.E. 2005. Riparia. Ecology, conservation, and management of streamside communities. Elsevier Academic Press, New York. 430 pp.
Newson, M. 1998. Hydrology and the River Environment. Clarendon Press, Oxford. (Library: U. of G. - GB 661.2.N49).
Pace, M. L. 2001. Prediction and the aquatic sciences. Can. J. Fish. Aquat. Sci. 58(1): 63–72.
Pauly, D. 2010. 5 easy pieces. The impact of marine fisheries on marine ecosystems. Island Press, Washington, DC. 193 pp.
Polis, G.A., Power, M.E., and G.R. Huxel. 2004. Food webs at the landscape level. The University of Chicago Press, Chicago. 548 pp.
Real, L.A. and J.H. Brown. Foundations of Ecology: Classic papers with commentary. The University of Chicago Press, Chicago. 905 pp.
Resh, V.H. and D.M. Rosenberg 1984. The Ecology of Aquatic Insects. Praeger Press, New York. 625 pp. (Not in library system).
Riley, J.P. and R. Chester 1981. Introduction to Marine Chemistry. Academic Press, New York465 pp.
Terborgh, J, Estes, J.A. 2010. Trophic cascades: Predators, prey, and the changing dynamics of nature. Island Press, Washington, DC. 465 pp.
Wetzel, R.G. 2001. Limnology. Saunders College Publishing New York.

Environmental Management and Planning

Blatt, H. 2005. America's environmental report card: Are we making the grade? The MIT Press, London, England. 277 pp.
Cech, T.V. 2003. Principles of water resources. History, development, management, and policy. John Wiley and Sons.
Erickson, S.L. and B.J. King. 1999. Fundamentals of environmental management. John Wiley & Sons Inc., New York. (Library: U. of W. - Porter stacks - GE300.E75).
Figueres, C.M., Tortajada, C., and J. Rockstrom 2003. Rethinking water management. Innovative approaches to contemporary issues. Earthscans Publications Ltd. London. 242 pp.
France, R.L. 2002. Handbook of water sensitive planning and design. Lewis Publishers, Boca Raton. (Library: U. of Guelph - TD657.H36).
Hessing, M., Howlett, M., and T. Summerville 2005. Canadian natural resource and environmental policy, Second edition. UBC Press, Toronto. 369 pp. (Library: UGMPSN91703)
McCann, K. S. 2000. The Diversity Stability Debate. Nature 405, 228-233.
Middleton, B. 1999. Wetland Restoration. Flood Pulsing and Disturbance Dynamics. John Wiley and Sons, New York. 388 pp. (Library: U. of G. - QH541.5.M3 M54).
Naiman, R.J., Magnuson, J.J., McKnight, D.M., and J.A. Stanford 1995. The Freshwater Imperative. Island press, Washington, D.C.165 pp. (Library: not in library system).
Phyper, J.-D. and B. Ibbotson 2003. The handbook of environmental compliance in Ontario. McGraw Hill Ryerson, Toronto. 397 pp.
Verry, E.S., Hornbeck, J.W., and C.A. Dolloff 2000. Riparian Management in Forests of the Continental Eastern United States. Lewis Publishers, Boca Raton. 402 pp. (Library: U. of G. - SD144.A112 R56).