



BIOL*3450 Introduction to Aquatic Environments

Fall 2022

Section(s): 01

Department of Integrative Biology

Credit Weight: 0.50

Version 1.00 - September 02, 2022

1 Course Details

1.1 Calendar Description

This course provides an introduction to the structure and components of aquatic ecosystems, how they are regulated by physical, chemical and biological factors, and the impact of humans on these environments and their biota.

Pre-Requisites: BIOL*1070, CHEM*1050, ZOO*2700 is strongly recommended

1.2 Course Description

The course will introduce and integrate the major processes that affect life in water. We will introduce aquatic environments, their origins, physical and chemical properties and structure, major groups of aquatic life and the processes that regulate life in waters. We will highlight important causal linkages between the physical, chemical and biological properties often using case studies in order to understand how life is supported and regulated in different aquatic systems.

Students are responsible for attending lectures that give a general overview of concepts that synthesize and supplement additional chapter readings. Previously recorded lectures from F21 will also be available on the course website and are supplied for students who may miss in-class lectures for health reasons. To encourage keeping up with lectures and the text readings, students will be evaluated with biweekly on-line quizzes that will evaluate knowledge of lecture and chapter reading material. Take home assignments will focus on quantitative skill development used to evaluate aquatic ecosystems. A take-home Final exam will evaluate your ability to synthesize, compare and contrast a pair of assigned aquatic ecosystems (see below).

Commensurate with a 3rd year science course, we will focus on evaluating critical thinking and synthesis skills that take and use basic knowledge to demonstrate your understanding of processes that regulate life in aquatic systems. Interpreting and creating graphs that reflect important aquatic processes is an important requirement. Minor arithmetic skills are required to calculate aspects of aquatic systems in the take-home assignments. The goal is for you to

develop a understandings about general processes that organize physical, chemical and biotic aspects of aquatic systems.

Successful completion of this course will require that students have access to an adequate personal computer and a strong connection to the internet for access to CourseLink and the course website, email for communication, audio-video of prerecorded lectures.

This course outline is subject to change up to the first day of classes in Fall 2022, in keeping with the policy described in the University of Guelph Academic Calendar.

1.3 Timetable

ROZH 103

1:30 - 2:20 pm - Mon/Wed/Fri

All lectures are to be delivered in class. Prerecorded lectures (from F21) will also be available asynchronously from the Content section of CourseLink should students miss in-class lectures. Students are expected to keep up with lectures throughout the term.

Timetable is subject to change. Please see WebAdvisor for the latest information.

1.4 Final Exam

A take-home final exam will evaluate your ability to critically compare the processes that structure and influence life in an assigned pair of ecosystems. You will address two questions:

1. What key abiotic and biotic process that strongly regulate life (productivity, abundance or diversity) are similar between the two ecosystems? (ie., shared processes that regulate life).
2. What key abiotic and biotic process that strongly regulate life (productivity, abundance or diversity) are unique and distinguish how life is regulated between the two ecosystems? (ie., unique processes).

Details of the Final exam are available on CourseLink.

2 Instructional Support

2.1 Instructional Support Team

Instructor: Beren Robinson

Email: berenrob@uoguelph.ca
Office: SSC 2455
Office Hours: The best way to contact me will be by my email above or by introducing yourself before/after regularly scheduled lectures.

Office Hrs:

Mondays: 2:30 - 3:30 pm

Wednesdays: 12:30 - 1:30 pm

2.2 Teaching Assistants

Teaching Assistant (GTA): Christopher Bender
Email: cbende02@uoguelph.ca

Teaching Assistant (GTA): Reilly O'Connor
Email: roconn03@uoguelph.ca

3 Learning Resources

We will introduce some of the key aspects of aquatic life before turning to the mechanisms and processes that regulate life in 5 distinct aquatic ecosystems (lakes, rivers, estuaries, coastal seas, open ocean). We will identify the important physical and chemical processes that regulate biological productivity, and the diversity and abundance of aquatic life.

In-class lectures will highlight key elements from relevant textbook chapters, but additional details will be acquired through the chapter readings.

Online quizzes every two weeks will encourage keeping up with course material.

Three take home assignments will develop quantitative skills and critical thinking.

A final take home exam is synthetic of the whole course.

3.1 Required Resources

courselink (Website)

Biol*3450 will make use of the UoG course website on CourseLink, including, links to pre-recorded lectures from F22 should you miss in-class lectures, online quizzes, materials for take home assignments and the final take home exam.

Announcements of course news, deadlines etc, will also be displayed on CourseLink. Please check it regularly.

Undergraduate Calendar is the source of all information about UoG procedures, policies and regulations.

See: <http://www.uoguelph.ca/registrar/calendars/undergraduate/current/>

Course text book (Readings)

It is your responsibility to get a copy of: Ecology of aquatic systems, 2ed.; M. Dobson and C. Frid 2009. A few copies will also be available through short loans at the McLaughlin Library reserve desk.

Lectures will highlight key ideas in the relevant chapter. The relevant chapters provide a richer framework to understand aquatic ecosystems and are required reading. Conceptual knowledge will be evaluated through regular biweekly online quizzes. The final take home exam will require you to compare and contrast two assigned ecosystems.

4 Learning Outcomes

4.1 Course Learning Outcomes

By the end of this course, you should be able to:

1. By the end of this course, students should be able to address the following conceptual goals:
 1. Explain how the concepts of stratification and mixing structures many aquatic systems. Synthesize and combine in your explanation the conditions and processes that both cause and disrupt stratification in water and how this affects river, lake and ocean properties that govern life.
 2. Identify and compare examples of ecologically relevant processes that operate on scales as small as molecules (or short term) up to large planetary scales (or long term) and synthesize how these affect life in water in different aquatic ecosystems.
 3. Explain the origins of water on earth, its presence in a set of major and minor reservoirs, how/why water moves among those reservoirs, and in so doing affects climate and weather, and creates a variety of different aquatic

environments.

4. Describe the formation of ocean basins, lakes and rivers with respect to plate tectonics, glaciation, other geological and biotic processes and provide evidence supporting different origin theories.
5. Describe successional processes that cause lakes, rivers and oceans to change over time, and discuss the evidence of these processes.
6. Explain how local landscapes affect life in lakes, rivers and coastal ecosystems. Explain 'connectivity' and how this supports unusually high productivity and biodiversity in certain aquatic systems.
7. Explain how the molecular features of water give it a special set of physical and chemical properties that cause many larger scale processes with important biological effects.
8. Explain how trophic interactions govern the flow of energy and nutrients in aquatic communities that influence population abundance, mediates material flow, and structures aquatic communities.

2. By the end of this course, students should be able to perform the following skills goals

1. Extract, interpret and/or create complex graphical information that represents important physical and chemical properties of aquatic environments and use these to infer important processes that structure these systems.
2. Demonstrate basic abilities to measure and interpret important basic features of aquatic systems.
3. Communicate in writing effective reports that summarize your analysis and understanding of how physical, chemical and biotic conditions affect life in aquatic systems based on course content and readings from the primary scientific literature.

5 Teaching and Learning Activities

This is an introductory course that provides a broad overview of aquatic organisms and their environments through in-class lecture material and chapter readings. Students are expected to demonstrate understanding at the 3000 university level. Assessment is based on students practising synthetic skills that combine an understanding of how physical and chemical properties from molecular to planetary scales govern aquatic environments and support or limit aquatic life in each of 5 aquatic ecosystems. Independent reading of assigned text chapters and scientific papers is an important component that will supplement recorded lecture materials and take-home assignments. The A-student will be able to

effectively discriminate and then describe the most important physical and chemical processes at different scales and how they influence life in similar and unique ways in a variety of aquatic ecosystems.

Course Content

The course is designed to introduce and begin to integrate the major processes that affect life in water. Lectures will introduce some general patterns of aquatic life, and then introduce 5 distinct aquatic ecosystems, their origins, physical and chemical properties and structure, major groups of aquatic life and the structure and processes that regulate life in waters. Lectures will highlight important causal linkages between the physical, chemical and biological properties of different aquatic systems often using case studies as well as contrast similarities and differences between aquatic ecosystems.

Lectures are designed to give a general overview of concepts that supplement and highlight text chapters read independently by the student. Factual and conceptual material from the recorded lecture and the reading materials will be evaluated with biweekly online quizzes.

Take-home assignments will teach and evaluate critical thinking, quantitative skills and efficient communication.

All quizzes, assignments and the final exam are open-book.

5.1 Lecture

Week 1

Topics:

Origins and general processes: global water cycle; general patterns of ocean and atmospheric circulation; general patterns of water chemistry, aquatic biodiversity; aquatic life styles; community features; energy and nutrient flow.

Textbook Chs. 1 - 2.

Pre-recorded lectures 1 - 9 inclusive.

Week 2

Topics: Origins and Processes continued

Week 3

Topics: Rivers: Flow; Disturbance; Biotics. Energy flow; Connectivity.

Textbook Ch. 3.

Pre-recorded lectures 10 - 14 inclusive.

Week 4

Topics: Rivers Continued

Week 5

Topics: Lakes: Origins; structure; Energy flow; Biotic interactions. Biodiversity and endemism; Succession.

Textbook Ch. 7.

Pre-recorded lectures 15 - 18 inclusive.

Week 6

Topics: Lakes Continued

Week 7

Topics: Estuaries the most extreme environment where fresh and saltwater mix.

Textbook Ch. 4.

Pre-recorded lectures 19 - 22 inclusive.

Week 8

Topics: Estuaries continued

Week 9

Topics: Coastal Seas: Structure; Biodiversity. Productivity; Degradation, Physical exposure and substrates; Energy flow; Zonation; Biotic interactions.

Textbook Ch. 5.

Pre-recorded lectures 23 - 26 inclusive.

Week 10

Topics: Coastal Seas continued

Week 11

Topics: Open ocean: Vertical structure; Light and nutrients; Productivity. Biodiversity; Movement; unique communities. Latitude and seasonal effects; Long scale cycles ENSO; Life cycle and tectonics; Management of scale.

Textbook Ch. 6.

Pre-recorded lectures 27 - 30 inclusive.

Week 12

Topics: Open Ocean continued

5.2 Quizzes, tests & take-home assignments

6 bi-weekly online quizzes will evaluate conceptual understand from recorded lectures and chapter text material.

3 take-home assignments will develop quantitative skills and critical thinking.

A take-home final exam will evaluate your ability to critically compare the processes that

structure and influence life in an assigned pair of ecosystems. You will address two questions:

1. What key abiotic and biotic process that strongly regulate life (productivity, abundance or diversity) are similar between the two systems? (ie., shared processes).
2. What key abiotic and biotic process that strongly regulate life (productivity, abundance or diversity) are unique and so distinguish how life is regulated in each system? (ie., unique processes).

All dates will be given in a "schedule of dates" on the first day of class.

All quizzes, assignments and the take-home final exam are 'open book'.

6 Assessments

6.1 Assessment Details

Assignment 1 (10%)

Due: Week 1

Scientific literature understanding.

Sept. 14 - 21 (due date)

Assignment 2 (20%)

Due: Week 6

Standard lake, river and watershed measurements and analyses.

Oct. 12 - 21 (due date)

Assignment 3 (20%)

Due: Week 10

El Nino - La Nina.

Nov. 7 - 18 (due date)

Take-home Final Exam (30%)

Date: Week 14

Synthetic compare and contrast of 2 assigned ecosystems.

Dec. 2 - 11 (due date)

Online Quizzes (20%)

6 online quizzes, one each in wk. 2, 4, 6, 8, 10, 12.

Best 5 out of 6. 4% each based on lecture material and chapter readings.

7 Course Statements

7.1 Instructor policies

Accommodation statement

I am here to support all students as best I can. There are two forms of accommodation: 'Accommodation' versus 'Academic consideration.'

Accommodation is for students that face a continuous academic challenge, and provides for extra time for tests, etc. Accommodations must be arranged by the student through the SAS office on campus. SAS then alerts me to student accommodations in the course. BUT it is far more effective if I work collaboratively with the student to make accommodations, rather than me working with an anonymous student through a generally over-worked SAS staff person. So, I encourage you to reach out to me directly for assistance and let me know of any SAS accommodations that you have in place. I encourage you to contact me as early as possible in term so that we have the best chance of making your learning experience better.

Academic consideration is usually a 'one off' event faced by a students such as a health or other relevant personal issue that interferes with course requirements. Consideration is requested and arranged by the student with Beren Robinson (not TAs). Contact me by email (if sick) or in person to arrange special consideration as early before a course deadline as possible. Proactive (ie., before the deadline) requests are more likely to be permitted than requests made after the deadline has passed. I may ask you about the basic nature of your issue and its timing relative to course deadlines.

Timing of take home work

You are provided with at least 1 week and sometimes longer to complete assignments and the take-home final exam. See details provided through CourseLink. All quizzes, assignments and the final take-home exam are open book.

3 Assignments: Details and materials will be available on the course website. Assignments are to be performed and reported as your individual work. Please see university academic misconduct guidelines below. PDF versions of your assignments are due (uploaded to the course dropbox in CourseLink) by the end of the specified due date (11:59 pm) unless

accommodation/consideration is agreed to in advance of the deadline with Beren Robinson. A late penalty of 20% per 24 hr period is assessed, including weekends, from the due date/time onward.

6 chapter quizzes: Will test conceptual knowledge from the lectures and text book chapter readings. They will be taken through the CourseLink website under the Quiz tab. Each quiz is time-sensitive and will be available for 3 days starting at 12:01 AM and ending at 12:59 PM on the dates noted. You sign-in and complete a quiz in one sitting. You have two attempts at each quiz and your best mark will be retained. There is NO opportunity to take quizzes after the end of each assigned quiz interval (note that your lowest quiz result does not go towards the quiz portion of your grade).

Expectations about Behaviour (in person or online): Inappropriate behaviour will not be tolerated. Examples of inappropriate behaviour include:

- Posting inflammatory messages about your instructor or fellow students
- Using obscene or offensive language in class or online
- Copying or presenting someone else's work as your own
- Adapting information from the Internet without using proper citations or references
- Buying or selling term papers or assignments
- Posting or selling course materials to course notes websites
- Having someone else complete your quiz or completing a quiz for/with another student
- Stating false claims about lost quiz answers or other assignment submissions
- Threatening or harassing a student or instructor online
- Discriminating against fellow students, instructors and/or TAs
- Using the course website to promote profit-driven products or services
- Attempting to compromise the security or functionality of the learning management system
- Sharing your user name and password
- Recording lectures without the permission of the instructor

Notification of recording of class activities

By enrolling in a course, unless explicitly stated and brought forward to their instructor, it is assumed that students agree to the possibility of being recorded during lecture, seminar or other "live" course activities, whether delivery is in-class or online/remote.

If a student prefers not to be distinguishable during a recording, they may:

1. turn off their camera
2. mute their microphone
3. edit their name (e.g., initials only) upon entry to each session
4. use the chat function to pose questions.

Students who express to their instructor that they, or a reference to their name or person, do not wish to be recorded may discuss possible alternatives or accommodations with their instructor.

8 Department of Integrative Biology Statements

8.1 Academic Advisors

If you are concerned about any aspect of your academic program:

- Make an appointment with a program counsellor in your degree program. [B.Sc. Academic Advising](#) or [Program Counsellors](#)

8.2 Academic Support

If you are struggling to succeed academically:

- Learning Commons: There are numerous academic resources offered by the Learning Commons including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills. You can also set up individualized appointments with a learning specialist. <http://www.learningcommons.uoguelph.ca/>
- Science Commons: Located in the library, the Science Commons provides support for physics, mathematic/statistics, and chemistry. Details on their hours of operations can be found at: <http://www.lib.uoguelph.ca/get-assistance/studying/chemistry-physics-help> and <http://www.lib.uoguelph.ca/get-assistance/studying/math-stats-help>

8.3 Wellness

If you are struggling with personal or health issues:

- Counselling services offers individualized appointments to help students work through personal struggles that may be impacting their academic performance. <https://www.uoguelph.ca/counselling/>

- Student Health Services is located on campus and is available to provide medical attention. <https://www.uoguelph.ca/studenthealthservices/clinic>
- For support related to stress and anxiety, besides Health Services and Counselling Services, Kathy Somers runs training workshops and one-on-one sessions related to stress management and high performance situations. <http://www.selfregulationskills.ca/>

8.4 Personal information

Personal information is collected under the authority of the University of Guelph Act (1964), and in accordance with Ontario's Freedom of Information and Protection of Privacy Act (FIPPA) <http://www.e-laws.gov.on.ca/index.html>. This information is used by University officials in order to carry out their authorized academic and administrative responsibilities and also to establish a relationship for alumni and development purposes.

For more information regarding the Collection, Use and Disclosure of Personal Information policies please see the Undergraduate Calendar. (<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/intro/index.shtml>)

8.5 Course Offering Information Disclaimer

Please note that course delivery format (face-to-face vs online) is subject to change up to the first-class day depending on requirements placed on the University and its employees by public health bodies, and local, provincial and federal governments. Any changes to course format prior to the first class will be posted on WebAdvisor/Student Planning as they become available.

9 University Statements

9.1 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.

9.2 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>

9.3 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>

9.4 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.

9.5 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>

9.6 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.

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>

9.7 Recording of 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.

9.8 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>

9.9 Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings, changes in classroom protocols, and academic schedules. Any such changes will be announced via CourseLink and/or class email.

This includes on-campus scheduling during the semester, mid-terms and final examination schedules. All University-wide decisions will be posted on the COVID-19 website (<https://news.uoguelph.ca/2019-novel-coronavirus-information/>) and circulated by email.

9.10 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).

9.11 Covid-19 Safety Protocols

For information on current safety protocols, follow these links:

- <https://news.uoguelph.ca/return-to-campus/how-u-of-g-is-preparing-for-your-safe-return/>
- <https://news.uoguelph.ca/return-to-campus/spaces/#ClassroomSpaces>

Please note, these guidelines may be updated as required in response to evolving University, Public Health or government directives.
