



BIOL*3450 Introduction to Aquatic Environments

Fall 2019

Section(s): C01

Department of Integrative Biology

Credit Weight: 0.50

Version 2.00 - September 04, 2019

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. Lectures 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. Lectures will highlight important causal linkages between the physical, chemical and biological properties of different aquatic systems often using case studies.

Lectures are designed to give a general overview of concepts that supplement and highlight text readings that are the responsibility of the student. To encourage keeping up with the text readings, students will be evaluated with on-line quizzes. Two take home assignments will focus on synthesizing processes to make inferences about conditions that regulate life in water.

Commensurate with a 3rd year science course, tests will be designed to evaluate critical thinking and synthesis skills in addition to basic knowledge. Two mid-terms will integrate a mix of multiple choice and short answer written questions. Interpreting and creating graphs that reflect important aquatic processes is an important requirement. Minor arithmetic skills are required to calculate aspects of aquatic systems. The final exam will be similar in design and integrate your knowledge about processes that regulate life in all aquatic systems. Formula sheets will be provided where necessary.

The goal is for you to develop a deeper understanding the processes that organize physical, chemical and biotic aspects of aquatic environments. The first mid-term will cover material

presented from the start of class up to the midterm 1. The second mid-term will cover material presented after the first midterm. The final will cover in some detail material presented after the 2nd midterm, but will also require synthetic comparing and contrasting of material across all types of aquatic systems presented throughout the course.

1.3 Timetable

ROZH 101

1:30 - 2:20 pm: Mon, Wed, Fri.

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

1.4 Final Exam

Dec 13 2019, 11:30-1:30. Exam time and location is subject to change. Please see WebAdvisor for the latest information.

2 Instructional Support

2.1 Instructional Support Team

Instructor:	Kevin McCann
Email:	ksmccann@uoguelph.ca
Telephone:	12269791716
Office:	SSC 2455
Office Hours:	9- 11am Friday

3 Learning Resources

3.1 Recommended Resources

courselink (Readings)

CourseLink Biol*3450 will make use of the UoG course website on CourseLink, including reading materials and links to online quizzes. Announcements of course news, deadlines etc, will also be displayed on the Biol*3450 CourseLink website, reflecting deadlines here. 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/>

4 Learning Outcomes

4.1 Course Learning Outcomes

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

1. Learning Outcomes

By the end of this course, students should be able to address the following goals and perform the following skills:

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, mediate material flow, and structure aquatic communities.
-

5 Teaching and Learning Activities

This is an introductory course that provides a broad overview of aquatic environments through a lecture format. Nevertheless, students are expected to demonstrate understanding at the 3000 level. Assessment is based on students practicing synthetic skills that combine your understanding of how physical and chemical properties from molecular to planetary scales govern aquatic environments and support or limit aquatic life. Independent reading of assigned text chapters and scientific papers is an important component that will supplement lecture materials and assignments. The A-student will be able to effectively describe and discuss how disparate physical and chemical processes at different scales cause biological effects in different types of aquatic ecosystems, and identify key similarities and differences among those systems.

Course Content

The course is designed to introduce and begin to integrate the major processes that affect life in water. Lectures will introduce aquatic environments, 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 readings by the student. Factual and conceptual material from the reading materials will be evaluated with one mid-term and a final exam designed to encourage students to keep up on readings. 4 mini-assignments will be part of the course material and will be small write ups based around four guest lecturers speaking about applied aquatic local and global issues.

Exams will be designed to test your critical thinking skills in addition to recalling basic information. The two exams will likely integrate a mix of multiple choice and short answer written questions. Interpreting and creating graphs that reflect important aquatic processes is an important requirement. Minor arithmetic skills will also be required to calculate aspects of aquatic systems. There will be no final and the project will serve as the final product of the course. You will be required to develop a deeper understanding of concepts about the processes that organize physical, chemical and biotic aspects of aquatic environments. The first mid-term will cover material presented from the start of class up to the midterm 1. The final will emphasize the second half but will include related material from the first half.

5.1 Lecture

Week 1

Topics: Global water cycle; ocean circulation; water chemistry. General aquatic biodiversity patterns. Aquatic life styles; community features; physical ecology

Week 2

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

Week 3

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

Week 4

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

Week 5

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

Week 6

Topics: Wetlands

Week 7

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

Week 8

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

Week 9

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 (Ch. 6)

Week 10

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 (Ch. 6)

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 (Ch. 6)

Week 12

Topics: Aquatic systems synthesis

5.2 Assignments

5 assignments based around lecture material and guest lecturers (guest lectures will be talking about applied aquatic issues). 4 of the assignments will be tests (done through courselink) that will aid preparation for exam material and test your understanding of course material. The final assignment will be a brief assignment based on the Friday applied guest lecturers and this assignment will be discussed in class. These lectures, tests and the assignment develop skills and understanding of processes and conditions in aquatic systems with special emphasis on applied issues in aquatic ecology and the environment. Assignments due dates will be given in a "schedule of dates" on the first day of class.

6 Assessments

6.1 Assessment Details

Midterm (30%)**Date:** Week 9

TBA: Late October

Assignment 1 (5%)**Due:** Week 3**Assignment 2 (5%)****Due:** Week 5**Assignment 3 (5%)****Due:** Week 7**Assignment 4 (5%)****Due:** Week 9**Final Exam (40%)**

Exam time and location is subject to change. Please see WebAdvisor for the latest information.

Assignment 5 (10%)**Date:** Week 13

7 Course Statements

7.1 Instructor policies

Some students require accommodations that are organized through the SAS on campus (See below). I am here to support all students but I cannot do this if students do not reach out to me for assistance, especially those registered with the SAS. You can make your learning experience better and my work easier if you inform me of any special needs in my class. This is not typically done by the SAS.

All assignments are due in class by the end of the scheduled class period unless consideration is agreed to in advance of the deadline by the instructor. Late penalty is 10% for reports handed in between end of class and 11:59 PM on the date due. Late penalty is 20% per each additional 24 hr period starting at 12:01 AM, including weekends.

Chapter quizzes: The four online quizzes will test basic knowledge from the 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 on the dates noted above. You will sign-in and then complete the quiz in one sitting. Details will be presented in class and on the course website.

Assignments: You will have one week to complete each of the two assignments. Details will be presented in class and on the course website. Assignments are to be performed and reported as your individual work. Please see university academic misconduct guidelines below.

Midterm and Final Tests: Are in scheduled class or exam times.

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/>

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>

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 book their exams at least 7 days in advance and not later than the 40th Class Day.

More information can be found on the SAS website

<https://www.uoguelph.ca/sas>

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>
