



# IBIO\*4600 Integrative Marine and Freshwater Research

Fall 2022

Section(s): 01

Department of Integrative Biology

Credit Weight: 1.00

Version 1.00 - September 07, 2022

---

## 1 Course Details

### 1.1 Calendar Description

In this course, students will integrate theory and analytical methods to address common problems in marine and freshwater biology. Particular emphasis will be placed on the process of inquiry including: development of research problems, data retrieval from existing literature, design and interpretation of experiments, sampling, statistical inference, and written and oral presentation.

**Pre-Requisites:** BIOL\*3450, (STAT\*2040 or STAT\*2230), (ZOO\*3210 or ZOO\*3610)

**Restrictions:** Restricted to students in BSCH.MFB.

### 1.2 Course Description

This capstone course in Marine and Freshwater *Research* emphasizes hands-on learning and the application of concepts taught throughout the Marine and Freshwater major. The overall objectives of the course are twofold: (i) provide every MFB student with the opportunity to conduct independent, mentor facilitated research, and; (ii) further develop critical skills/techniques that will aid students in pursuit of careers related to their broad training in the aquatic sciences. The research portion of this course allows students to develop and pursue an independent scientific question of their interest. Emphasis in this half of the course will be placed on the development of research problems/hypotheses/predictions, placement of research within existing literature, data retrieval and synthesis from existing literature, design and interpretation of experiments, sampling, statistical inference, and finally scientific communication (i.e., written and oral presentations). This type of problem-solving in group settings is a must for any future application of the MFB degree in industry, academia or government. Finally, in order to hone the necessary skills and perspective for a career in marine and freshwater science, workshops will be given to help steer the students in all aspects of research and its application. This latter aspect of the course includes modules (for

example: animal husbandry, data analysis, and field sampling techniques), discussion groups, and seminars addressing potential career options. All MFB and MFB-c majors following a regular schedule will be expected to take this course. This is a draft course outline and is subject to change up to the first day of classes, in keeping with the policy described in the University of Guelph Academic Calendar.

### 1.3 Timetable

All lecture and labs for IBIO\*4600 will be in person

**LECTURES:** 10:00 - 11:20 Monday and Wednesday SCIE 2315

**LABS:** 2:30- 5:20 Wednesday, SCIE 2305/ 2303

Please note the proposed course format, schedule or location for the Fall 2022 semester may change up to the first day of classes due to personnel, resource, and public health circumstances and if conditions cannot be met to ensure the safety of our students and instructors. Continue to watch the Student Planning website as format information could be updated until the first day of classes.

### 1.4 Final Exam

There is no scheduled final exam for this course

---

## 2 Instructional Support

This course includes significant time framing a research problem and applying this research problem within the Hagen Aqualab or in a relevant freshwater ecosystem. This course includes research and lab support.

### 2.1 Instructional Support Team

<b>Instructor:</b>	Kevin McCann
<b>Email:</b>	ksmccann@uoguelph.ca
<b>Telephone:</b>	12269791716
<b>Office:</b>	SSC 1464
<b>Office Hours:</b>	after lecture Thursdays 11:30 to 12:00 via Zoom

<b>Lab Co-ordinator:</b>	Sheri Hincks
<b>Email:</b>	shincks@uoguelph.ca
<b>Telephone:</b>	+1-519-824-4120 x56010
<b>Office:</b>	SSC 3509

### 2.2 Teaching Assistants

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

---

## 3 Learning Resources

This course requires no books, as the professor, lab instructor and teaching assistant act as guides/mentors overlooking each group research project.

### 3.1 Required Resources

#### **Courselink (Website)**

This course makes extensive use of Courselink, the University of Guelph's online learning environment. The course website will provide information and updates about the course, including discussions, assignments as well as lecture and lab content. Some of the lecture slides will be posted 24 hours before our scheduled lecture time.

#### **ZOOM (Software)**

Students should register for a free basic Zoom account in order to attend any potential synchronous Zoom meetings for lectures, labs and virtual office hours.

Please visit <https://zoom.us> to register for a free basic Zoom account **using your University of Guelph email address** (Gryphmail). Please make sure you have the most updated version of ZOOM.

It is VERY IMPORTANT that you use your Gryphmail to register for your account and **NOT** any other email address (eg Gmail or hotmail accounts or Facebook).

#### **Lab Notebook (Other)**

Each of you will be required to maintain your own bound Lab Notebook. It will serve as a written record of everything you do for your research and will include observations, data sheets, drawings, questions, insights, ponderings, and aha moments. Any bound notebook will work (the bookstore has some, as does the dollar store).

### 3.2 Recommended Resources

#### **Textbook (Textbook)**

The following suggested books are helpful. There are also paper books, electronic books and technical reports on reserve at the library that you may find useful (see course outline)

Hofmann, A. 2019. Scientific Writing and Communication 4th edition

Northey, M. and Aderkas, P.V. 2011. Making sense: A student's guide to research and writing

Ruxton, G.D. and Colegrave, N. 2003. Experimental design for the life sciences.

#### **Writing services at the University of Guelph Learning Commons (Other)**

<https://www.lib.uoguelph.ca/writing-studying/writing-resources-workshops>

## 4 Learning Outcomes

### 4.1 Course Learning Outcomes

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

1. **The overall learning outcome this course offers is the ability for students to begin to understand how to use their undergraduate training to navigate complex real world research problems rooted in aquatic biology. Specifically a student completing this course will be able to:**

Learning outcomes:

- Apply critical thinking, analysis, and inquiry skills to challenges related to aquatic biology
- Develop a research idea (based upon the integration of scientific literature, preliminary observations, and challenges arising during the experiment) into a defensible proposal and project.
- Quantitatively synthesize relevant scientific literature into a database such as Mendeley.
- Feel comfortable designing field studies, formatting your data, choosing a statistical analysis method and using software for univariate statistics.
- Understand and apply field methods and techniques used in aquatic/marine science.
- Know the differences between writing a scientific paper for a journal and a technical report for government policy makers/company executives.
- Synthesize knowledge and effectively communicate (in both written and oral forms) research findings to peers and potential stakeholders within the field of aquatic sciences.
- Develop the skills to work with other professionals effectively towards a common research goal.

---

## 5 Teaching and Learning Activities

Activities and Format

The capstone course consists of the following components: i) lectures, labs/ workshops, and;

ii) group research projects.

Lectures-workshops/Labs: Students, TA and instructor(s) will meet several times a week. These meetings are used to guide the students in scientific methods as well as generally explore the role of the biological sciences in society. Short lectures give students the tools they need to conduct their research, perform literature research, discuss and integrate concepts, evaluate work by their peers, keep a laboratory/field notebook, present their work orally and in writing and work successfully in small groups. Hence, lectures include but are not limited to the scientific method, experimental design, statistical analysis and software, use of public databases, writing scientific papers, giving oral presentations, peer review, techniques in meta-analysis, and methods for problem-solving of the scientist. Lab modules will be held in conjunction with materials covered in class meetings and lectures. Once the research projects are underway these lab periods are utilized to teach methods that students will need to successfully complete their projects as well as selected methods that are an essential tool kit for a student graduating from a marine and freshwater program. These techniques include but are not limited to statistical analysis, water chemistry, sampling methodologies in aquatic ecosystems, and analyses of experimental datasets.

Independent Group Research Project: The group research project will help to implement all learning objectives of this course (see above). While proposal development, proposal submission and data collection will be completed as a group, report writing (literature review and final research), and presentations will be completed as a group or individually (please see the course assessment for more details). Literature review and final paper presentations will, however, be a coordinated presentation among group members (explanation of format will be given). Each research group will consist of four individuals. An informal peer review system may be used to critically evaluate the work of peers. The research component also involves the preparation and evaluation of a lab/field notebook.

---

## 6 Assessments

Students are assessed for both their participation and development of a research project within a research group.

In all cases, students will be expected to write using complete sentences and proper grammar. **All students are expected to complete and submit work individually unless otherwise stated.**

Assessment standards for this course follow the definitions given in the 2022 -2023 Undergraduate Calendar

## 6.1 Marking Schemes & Distributions

Assessment	Weight
Research Proposal (group)	20
Lab notebook (group)	5
Oral Presentations (each individual in group does 1 of the 4 presentenations)	20
Participation- Research conduct/ effort (individual)	10
Written course reflection (individual)	5
Final research Paper- Group- Methods and Results (group)	15
Final research paper - Individual- Abstract, Introduction, Discussion/ Conclusion (individual)	25

Lab/ workshop attendance is mandatory.

Assessment standards for this course follow the definitions given in the 2022-2023 Undergraduate Calendar

## 7 Course Statements

### 7.1 Time Zones

PLEASE NOTE ALL TIMES REPORTED IN THIS COURSE OUTLINE AND ON COURSELINK ARE EASTERN TIME (GUELPH, ONTARIO, CANADA)

### 7.2 Appropriate Use of Discussions and ZOOM

This course has been designed to foster interaction between students, student teams and with the instructors. The Discussions in Courselink, and our synchronous TEAMS sessions provide a means for team members to share ideas, opinions, and resources. Please show respect for the opinions of others at all times, even if you do not agree with their ideas. We

encourage you to disagree, critique and add new insights, but this must be done in a positive manner. Discussions in the online conferences and synchronous learning sessions must be treated the same as face-to-face discussions. In the conferences others cannot see such things as facial expression and body language, both of which we normally take into account when talking face-to-face with someone. Therefore, be very careful in the phrasing of your contributions and responses, as they may be interpreted differently than what you had intended. Please respect your fellow students.

### **7.3 Use of Social Media**

The university is aware that many students use Facebook Groups and other social media to communicate with their peers about course work. These media can be useful for communicating about and learning course material. However, please we aware that:

- Discussion boards on courselink are also beneficial as they are monitored by instructors who can provide guidance and factual information about a course and avoid false or misleading information.
- All students have a responsibility to behave with the utmost of integrity when in a class Facebook group just as in other forms of course interaction.
- Any behaviour that violates the course expectations and the trust upon which all learning depends, constitutes academic misconduct (see Undergraduate Calendar).
- Academic misconduct includes sharing answers from online quizzes or sharing information about exams with those who have yet to complete them. Accepting answers distributed by students also makes you complicit in academic misconduct.
- All potential forms of misconduct on social media are taken as seriously as any other form of misconduct on campus and will be investigated vigorously.

Please consider the potential impact of academic misconduct on your record. Take all steps to avoid instigating or participating in this kind of activity. It's not worth it.

### **7.4 Late Policy**

All items are due on the dates shown by the specified time. Late submissions will be accepted, but may be penalized 10% for each 24 hour period late. , including weekends.

Please do not hesitate to reach out to us if you are struggling to meet deadlines for ANY reason.

### **7.5 Copyright Notice**

Content within this course is copyright protected. Third party copyrighted materials (such as

book chapters and articles) have either been licensed for use in this course, or have been copied under an exception or limitation in Canadian Copyright law.

Presentations that are made in relation to course work - including lectures and labs- 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.

## 7.6 Use of Animals

The University is committed to principles of conducting research and teaching in accord with the highest ethical standards. Given that the use of animals, in research and teaching, is a critical aspect of the work of the University of Guelph, the Department of Integrative Biology is committed to minimizing the use, pain, and suffering of animals used for teaching and to ensuring that animals which are used will receive care and treatment that meets or exceeds the standards outlined by provincial guidelines and statutes, and by the Guidelines of the Canadian Council on Animal Care. For more information

[https://www.uoguelph.ca/ib/animal\\_use](https://www.uoguelph.ca/ib/animal_use)

<https://www.uoguelph.ca/research/for-researchers/ethics-and-regulatory-compliance/animals>

## 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.

---