IBIO*4600 Integrative Marine and Freshwater Research

Fall 2018
Section(s): C01

Department of Integrative Biology
Credit Weight: 1.00
Version 1.00 - August 17, 2018

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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-Requisite(s): BIOL*3450, (STAT*2040 or STAT*2230), (1 of ZOO*3200, ZOO*3210, ZOO*3610)
Restriction(s): 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 (i.e., meta-analysis), 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 students that are MFB majors will be expected to take this course.

1.3 Timetable

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

1.4 Final Exam

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

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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 ecosystem. This course includes research and lab support.

2.1 Instructor(s)

Kevin McCann
Email: ksmccann@uoguelph.ca
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2.2 Instructional Support Team

Lab Co-ordinator: Matt Cornish
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Telephone: +1-519-824-4120 x52714
Office: HAQL 140

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3 Learning Resources

This course requires no books, as the profressor and teaching assistants act as guides/mentors overlooking each group research project. Nonetheless, the following suggested books are helpful.

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.

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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
- Develop a research idea (based upon the integration of scientific literature, preliminary observations, and challenges arising during the experiment) into a defendable proposal and project.
- Quantitatively synthesize relevant scientific literature and perform
- Understand and apply techniques used in aquatic/marine science (i.e. animal husbandry)
- Synthesise knowledge and effectively communicate (in both written and oral forms) research findings to peers and potential stakeholders within the field of aquatic
- Develop the skills to work with others effectively towards a common

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5 Teaching and Learning Activities

Activities and Format

The capstone course consists of the following two components: i) workshops, and; ii) group research projects.

Workshops: Students, TA and instructors will meet on a weekly basis. These meetings are used to guide the students in “field/lab” methods and 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.

Research Project: The research project will help to implement all learning objectives of this course (see above). While proposal development and data collection will be completed as a group, all report writing (proposal and final) and presentations will be completed individually. Each research group will consist of four individuals. A peer review system will 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. Note that while you work in a group, most written and oral assessments are done individually.

6.1 Assignments and Marking

Assignment	Grade Percentage
Research Proposal	15%
Literature/Data Review	20%
Field/Lab Notebook	5%
Research conduct / Group Effort	5%
Oral Presentation	20%
Final Paper	35%

7 University Statements

7.1 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.

7.2 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 regulations and procedures for Academic Consideration are detailed in the Undergraduate Calendar.

7.3 Drop Date

Courses that are one semester long must be dropped by the end of the fortieth class day; two-semester courses must be dropped by the last day of the add period in the second semester. The regulations and procedures for Dropping Courses are available in the Undergraduate Calendar.

7.4 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.

7.5 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: www.uoguelph.ca/sas

7.6 Academic Misconduct

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 discourages misconduct. 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.

The Academic Misconduct Policy is detailed in the Undergraduate Calendar.

7.7 Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the 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.

7.8 Resources

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