

University of Guelph - College of Biological Science  
Department of Integrative Biology

## COURSE OUTLINE

### Integrative Marine and Freshwater Research (IBIO\*4600) – Fall 2017

#### Synopsis

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 I

#### Teaching Team

##### *Professor*

**Dr. Roy Danzmann** Department of Integrative Biology, University of Guelph; 519-824-4120 x58364; Office: SSC 1460, Office hours: t.b.a. E-mail: [rdanzman@uoguelph.ca](mailto:rdanzman@uoguelph.ca)

##### *Lab Co-ordinators*

**Matt Cornish** (Manager, AquaLab) Department of Integrative Biology, University of Guelph 519-824-4120 x52714; Office: AquaLab 140; E-mail: [mcornish@uoguelph.ca](mailto:mcornish@uoguelph.ca)

**Mike Davies** (Resource member, AquaLab) Department of Integrative Biology, University of Guelph 519-824-4120 x52714; Office: AquaLab 140; E-mail: [mcdavies@uoguelph.ca](mailto:mcdavies@uoguelph.ca)

##### *Teaching Assistant*

tba

## Course Schedule

*Lectures* Tuesday / Thursday, 1:00pm-2:20pm, location SSC Rm 2303

*Labs* Thursday, 2:30pm-5:20pm, location SSC Rm 2303

## Learning Objectives

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:

1. Apply critical thinking, analysis, and inquiry skills to challenges related to aquatic ecosystems.
2. 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.
3. Quantitatively synthesize relevant scientific literature and perform statistics.
4. Understand and apply techniques used in aquatic/marine science (i.e. animal husbandry)
5. Develop the skills to work with others effectively towards a common goal.
6. Synthesize knowledge and effectively communicate (in both written and oral forms) research findings to peers and potential stakeholders within the field of aquatic sciences.

## Format:

The capstone course consists of the following two components: i) Workshops and ii) Group research project. Material covered in these two components will be tightly coordinated and contains the following specific components:

**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) will be completed individually, unless specified as a group presentation. Oral presentations will be presented in pairs or as a group. 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

## Resources – Course Materials

### **Accompanying suggested textbooks:**

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

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

### **CourseLink:**

This course will make use of the University of Guelph's course website on D2L (via *CourseLink*). Consequently, you are responsible for all information posted on the *CourseLink* page for **IBIO\*4600**. Please check it regularly.

### **Undergraduate Calendar:**

This is the source of information about the University of Guelph's procedures, policies and regulations, which apply to undergraduate programs. It can be found at: <https://www.uoguelph.ca/registrar/calendars/undergraduate/current/index.shtml>

### **Lab equipment:**

Students will be responsible for providing their own dissection instruments, rulers, pencils, and laboratory notebooks.

## Course Structure and Assessment

Assignment / Event	Grade Percentage	Date
First class		Thursday, Sept. 7
Research Proposal (oral x group)	<b>5</b>	September 21
Research Proposal (written x group) <sup>+</sup>	<b>10</b>	Sept. 29, 11:00 pm
Research Progress (oral x group) <b>**</b>	<b>5</b>	October 19
Research Progress (written x individual) <sup>++</sup>	<b>2.5</b>	October 27, 11:00 pm
40 <sup>th</sup> class day		Friday, Nov. 3
Literature meta-analysis seminar (oral x individual x 2)	<b>25*</b>	November 16
Research seminar (oral x individual x 2)	<b>25*</b>	November 23
Final literature review paper (written x individual)	<b>25</b>	Nov. 29, 11:00pm
Final research report due (written x individual)	<b>25</b>	Nov. 29, 11:00pm
Research data record book	<b>2.5</b>	November 29
Final class day		November 29

+ The research proposal is a 'joint' submission and should be no more than 5 pages in length (1.5 line spacing x 11 pt. font minimum).

++The research progress report is an 'individual' submission and should be no more than 3 pages in length (1.5 line spacing x 11 pt. font minimum).

The research final report and literature meta-analysis report is an 'individual' submission and should be no more than 10 pages in length (1.5 line spacing x 11 pt. font minimum).

\* Each student within a group will either present a seminar on the literature review aspects of their project, or present findings on their joint experimental findings. Note: these presentations need to be 'co-ordinated' between presenters.

\*\* The research progress presentation may be given by 1 or more members of the group, however, all members will receive the same grade regardless of who is presenting the report. The session is meant to provide some feedback to the groups if unanticipated problems have arisen in the implementation of the research project. Participation and constructive criticism from all the students in the course is encouraged and will be graded.

## Course Policies

### *Assignment of Grades*

Work in this course is evaluated according to the University of Guelph grading standards. For a definition of the numerical grades you receive please see Resolution 1 in the section on Grading Procedures under Grades in VIII: Undergraduate Degree Regulations and Procedures in the University of Guelph 2016-2017 Undergraduate Calendar.

- See Resolution 1 under [Grading Procedures](#) in the Undergraduate Calendar for a description of grading standards used at the University of Guelph.

**Link:** <https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-grds-proc.shtml>

Grading rubrics will be used to illustrate the specific grading criteria used to evaluate the lab reports. These are available on *CourseLink*.

You may check your grades at any time during the semester through the Grades page on the course website.

### *Late Policy*

Work that is handed in late will be penalized 20% for every day that it is late for written assignments, and 100% for oral assignments, unless prior arrangements have been made.

***Absence and Illness*** If you are absent from classes during the semester, you will be expected to make up missed lecture and laboratory material on your own.

### *Academic Consideration*

If you miss deadlines for medical, psychological, or compassionate reasons, please contact the instructor as soon as possible to make alternate arrangements. For more details about academic consideration see the section on Academic Consideration, Appeals and Petitions in the University of Guelph 2016-2017 Undergraduate Calendar.

- See the section on [Academic Consideration, Appeals and Petitions](#)

**Link:** <https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

for details regarding academic consideration.

### *Academic Integrity*

Although we do encourage you to share thoughts and ideas while studying for the course, all material submitted for grading **MUST BE YOUR OWN** work unless it is specified as a group paper or presentation! The University takes a serious view of academic misconduct, including plagiarism. The penalties for academic misconduct are severe and can lead to expulsion from the University and the revocation/rescinding of a degree.

### *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:

- **Link:** <http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.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.

### *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.

## **Course Philosophy and Roles**

### *Pedagogical Values*

This course aims to support the mission statement and the learning objectives set out by the University of Guelph in the Undergraduate Calendar. This means that this course will be research intensive and learner-centered. Ultimately we want students to be capable of self-assessment, critical inquiry, and active learning.

- Read the University of Guelph **Mission Statement** in the Undergraduate Calendar.  
**Link:** <https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c02/index.shtml>
- Read the University of Guelph **Learning Outcomes** in the Undergraduate Calendar.  
**Link:** <https://www.uoguelph.ca/registrar/calendars/undergraduate/2016-2017/outcomes/>

### *Accessibility*

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the *Student Accessibility Services* as soon as possible.

For more information, contact SAS at 519-824-4120 ext. 56208 or email [csd@uoguelph.ca](mailto:csd@uoguelph.ca) or see the website: **Student Accessibility Services**

**Link:** <https://www.uoguelph.ca/csd/>

### *Teaching Philosophy*

In support of the University Mission statement, we will adopt a learner-centered approach to teaching. In this course, that means that instructors are not the only ones responsible for depositing knowledge into the minds of students. Instead, you are expected to take an active role in your own learning. The teaching team will provide opportunities for you to learn independently and from one another, and will coach you in the skills needed to do so effectively. The lecture component provides the required content material for your understanding and enables you to build upon this knowledge. Metaphorically speaking, the lab instructor and teaching assistant will not be “the sage on the stage” but rather “the guide on the side”, because research shows this method can lead to an increased motivation to learn, greater retention of knowledge and a deeper understanding of the material.

### *Teaching Team’s Role and Responsibility to Students*

In this course you can expect your instructors to...

- Clearly define the course learning objectives
- Provide well articulated activities that enhance learning
- Ensure timely and fair grading procedures
- Notify you of events, deadlines, announcements concerning grades, and other official information
- Provide and adhere to well defined policies and procedures as described in the course outline, and the Undergraduate Calendar
- Provide assistance, when asked, if you are having difficulties in the course
- Foster and uphold an environment of academic integrity and a love of learning

### *Your Learning Responsibilities*

Your success in this course depends on your response to the opportunities this course offers you. As a student in this course, you are responsible for...

- Knowing the course learning objectives as covered in the lecture and lab components each week.
- Prepare for, attend, and review your lecture and lab components.
- Contact your professor if you have any difficulties with the course.
- Completing all required lecture and lab objectives and assignments.
- Reading the assigned resources on the course website and through e-reserve.
- Reading all announcements and other class material distributed in class or on-line.
- Accessing the *CourseLink* regularly for important communications from the course instructors or teaching assistants.
- Understanding and adhering to policies and procedures as described in the course outline, and the Undergraduate Calendar.
- Understanding grading procedures.
- Familiarizing yourself with the course schedule of dates with particular attention to deadlines.
- Initiating action, in advance of due dates, by consulting your instructor or program counsellor if extenuating circumstances affect your academic performance.
- Understanding what constitutes academic misconduct and refraining from it.

### *E-mail Communication*

As per university regulations, all students are required to check their <mail.uoguelph.ca> 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 in writing, with your name, id#, and e-mail contact. See the undergraduate calendar for information on regulations and procedures for Academic Consideration:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

### *Drop Date*

The last date to drop one-semester courses, without academic penalty, for Fall 2017 is Friday, November 3, 2017. For regulations and procedures for Dropping Courses, see the Undergraduate Calendar: <http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

### *Technical Requirements*

The course web site provides the connection between you and your fellow classmates. When collaborating on class data, it is essential that you are able to connect properly to our course in *CourseLink*. For adequate interaction with the course web site please make sure that your computer meets the minimum requirements.

- See the recommended [System Requirements](#) for use with *CourseLink*.
- **Link:** <http://www.uoguelph.ca/courselink/systemRequirements.html>

If you do not have these technical requirements, consider either upgrading your personal computer, or using a machine on-campus. Trying to use someone else's computer for the course may prove to be frustrating and difficult.

Please follow this quick System Check to determine if you have the right setup. (Results will be displayed in a new browser window).

- Do a [System Check](#) to make sure that your computer is configured properly for this course. **Link:** <https://courselink.uoguelph.ca/d21/systemCheck>

### **Course Evaluation**

#### **Course Evaluation information** (from the CCS website)

CCS now provides the U of G Online Course Evaluation System in a secure, online environment. End of semester course and instructor evaluations provide students the opportunity to have their comments and opinions form part of the information used by



Promotion and Tenure Committees in evaluating the faculty member's contributions in the area of teaching.

Course evaluations are now conducted through this web site. Login with your central email account login ID and password.

[https://courseeval.uoguelph.ca/CEVAL\\_LOGIN.php](https://courseeval.uoguelph.ca/CEVAL_LOGIN.php)

Occasionally course evaluations are conducted in class.

**Please Note:**

Instructors do **NOT** receive evaluations until the end of exam period. Furthermore, evaluations are anonymous, unless you specifically indicate you want to acknowledge your comments.

NOTE: This outline is distributed for information and is available via *CourseLink*. Failure to obtain a copy of this outline in the first instance, or to read and respond accordingly to its contents, are not acceptable grounds for complaints after the first week of classes.

In particular, no changes in the marking, grading or evaluation scheme will be made without the agreement of the professor, lab instructor and the written consent of all students enrolled in the course. There will be no unofficial deferments of any scheduled evaluation. Students who miss any evaluation for documented medical or other legitimate reasons will have their final grades pro-rated on the basis of completed evaluations. No make-up evaluations will be conducted during the semester. Students who miss laboratories for any reason are responsible for the material covered.