

**University of Guelph
College of Biological Science
Department of Integrative Biology
BIOL*4600 – Integrative Marine and Freshwater Research**

**COURSE OUTLINE
Fall 2014**

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 will be placed on the scientific method in developing questions in relation to research problems/ hypotheses/ predictions, and the 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), and discussion groups. All students that are MFB majors will be expected to take this course.

Teaching Team:

Roy Danzmann SCI 1460 rdanzman@uoguelph.ca
Matt Cornish Aqualab
Student TA: TBA

Course schedule:

Lecture	Tuesday, Thursday	10:00am – 11:20am	SCI - 3315
Lab	Thursday	2:30pm – 5:20pm	SCI - 2314

Learning Outcomes and Skills:

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) Synthesize knowledge and effectively communicate (in both written and oral forms) research findings to peers and potential stakeholders within the field of aquatic sciences.

6) Develop the skills to work with others effectively towards a common goal.

Course Resources:

No specific textbooks are required for this course as students are expected to compile their own literature catalogues through Web of Science or other library resource databases. However, there are two accompanying suggested texts that students may find of value.

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.

Course content:

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) 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.

Course Hours:

Tues: 1.5 hour lecture

Thurs: 1.5 hour lecture, 3 hour lab

Expectations are large for self-motivated learning. A large commitment towards reading the literature and spending time on data collection for your project is expected each week.

Assignments and Marking:

Assignment/Event	Grade Percentage	Date
First class		September 4
Research proposal (oral x group)	5	September 18
Research proposal (written x group)	10	September 26
Research progress (oral x group)**	5	October 16
Research progress (written x individual)	2.5	October 24
40 th class day		October 30
Literature meta-analysis seminar (oral x individual x 2)	25*	November 13
Research seminar (oral x individual x 2)	25*	November 20
Final literature review paper (written x individual)	25	November 21
Final research report due (written x individual)	25	November 27
Research data record book	2.5	November 27
Final class day		November 27

- * 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 the two presenters.
- 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 a 'joint' 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).
- ** 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 and University Policies:

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. You should be prepared to provide supporting documentation for consideration. 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>

Term Work: All assignments must be completed on the dates specified. No late submissions will be accepted and they will be given a zero grade. Zeros will be deleted from the record when a request for academic consideration from an appropriate counselor (Program counselor or equivalent), on the basis of legitimate compassionate or medical grounds, is received by the course instructor. Students' final grades will be prorated on the basis of the completed work, if the completed work comprises at least 80% of the final

grade. Otherwise, a grade of INC will be submitted and the Academic Review Sub-Committee will make recommendations on final grade adjustments.

Final work: The last assignment for the course is considered the 'final work' in the course, and will generally represent the major assigned academic portion of the course. Failure to submit the 'final work' will result in an INC being awarded as the grade for the course. This will require review by the Academic Sub-Committee. If the Sub-Committee receives documentation to warrant it, and if the completed work comprises at least 65% of the final grade (that is, no term work was missed), the instructor can recommend a grade prorated on the basis of the completed term work. If the Sub-Committee awards a deferred condition or privilege, the deferred condition or privilege will be to complete the final assignment. To the extent that non-participation could be considered obstruction and interference to learning by other students in the group, penalties may also be in order under University policy with regard to academic misconduct (see below).

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 Centre for Students with Disabilities as soon as possible.

For more information, contact CSD at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: <http://www.csd.uoguelph.ca/csd/>

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:

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

E-mail Communication: As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students. In addition, Courselink will be used to distribute information during this course, and therefore, all students are required to check the D2L Courselink site regularly.

Drop date: The last date to drop one-semester courses, without academic penalty, is the 40th class day. To

confirm the actual date please see the schedule of dates in the Undergraduate Calendar. For regulations and procedures for Dropping Courses, see the Undergraduate Calendar:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.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 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

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

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:

<http://www.uoguelph.ca/registrar/calendars/index.cfm?index>

If you are concerned about any aspect of your academic program: Make an appointment with a program counselor in your degree program. <http://www.bsc.uoguelph.ca/index.shtml> or

<https://www.uoguelph.ca/uaic/programcounsellors>

If you are struggling to succeed academically: 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.learnincommons.uoguelph.ca/>

If you are struggling with personal or health issues: Counseling 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>