

University of Guelph
College of Biological Science
Department of Integrative Biology
BIOL*4600 – Integrative Marine and Freshwater Research
COURSE OUTLINE
Fall 2015

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: (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. One aspect of the course will focus on the long term goals of the individual student. This will involve developing a prospectus for future employment goals. 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 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.

IBIO*4600 Integrative Marine and Freshwater Research F (3-3) [1.00]

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.

Prerequisite(s): [BIOL*3450](#), ([STAT*2040](#) or [STAT*2230](#)), ([ZOO*3200](#) or [ZOO*3210](#))

Restriction(s): [ZOO*4540](#). Restricted to students in BSCH.MFB.

Teaching Team:

Jim Ballantyne SCI 3654 jballant@uoguelph.ca
Matt Cornish Aqualab
Student TA: TBA

Course schedule:

Lecture Monday, Wednesday; 10:00am – 11:20am; Room TBA

Lab Wednesday; 2:30pm – 5:20pm; SSC 2303

Learning Outcomes and Skills:

The overall learning outcomes this course offers are 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 and develop an understanding of the complexities of finding employment in their area of interest. Specifically a student completing this course will be able to:

- 1) Apply critical thinking, analysis, and inquiry skills to establish the approach needed and skills required to work in their area of interest.
- 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. 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 VonAderkas, P. 2011. Making sense: A student's guide to research and writing.

Course content:

The capstone course consists of the following components: i) lectures and instrumentation training sessions; ii) Individual personal goal research project; iii) Group research project. Students, TA and instructors will meet on a weekly basis. These meetings are used to guide the students in scientific methods. 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 will be utilized to trouble shoot projects.

Aqualab Facility: There is a \$20 refundable deposit for access card.

Guest speakers: Depending on availability, 4-5 guest speakers will speak to the class about their work and the practicalities of obtaining work in their field.

Prospectus - personal goals research project: In order to better prepare for the “real world” students will research an aspect of their future goals. This will include researching the availability of employment, skills needed, logistical needs (if any), regulations involved and other factors. This will be done in collaboration with staff and using course guidelines. A write-up and oral presentation will be given.

Group Research Project: The research project will help to implement all learning objectives of this course (see above). A single research proposal write-up will be submitted by each group. While proposal development and data collection will be completed as a group, the final report and oral 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:

Monday: 1.5 hour lecture

Wednesday: 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.

METHODS OF ASSESSMENT AND IMPORTANT DATES

Assignment/event	Grade percentage	Date
First class meeting		
Lecture: Methods		Week 2
Lab: methods		Week 2
One page on future goals	5	Monday 2 nd week
Research Project Proposal	5	Monday 3 rd week
Guest speakers		Weeks 2-6 TBA
Personal goals project write-up	25	Monday Week 6
Personal goals oral critique	2.5	Monday week 6
Personal goals project oral	10	Weeks 6-8
Research project written progress report	5	Week 7
Research written project report	25	Week 12
Research report oral	10	Week 11-12
Research report oral critique	2.5	Weeks 11-12
Data book, conduct, attendance	10	Week 12
Total	100	

1. Each student will present a seminar based on their personal goals project (10%).
2. The research proposal is a “joint” submission and should be no more than 5 pages in length. It is worth 5 % and each person in the group will receive the same grade.
3. The research progress report is a joint submission and should be no more than 3 pages in length. It is worth 5 % and each person in the group will receive the same grade.
4. The research final report is an individual submission and has no length restrictions. It is worth 25% of the final grade. A grading rubric will be provided.

Course and University policies

When you cannot meet a course requirement

When you are unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor (or lab instructor) as applicable, in writing with your name, ID number, and e-mail contact, and be prepared to provide supporting documentation. See the undergraduate calendar for information on regulations and procedures for Academic Consideration:

[Academic Consideration](#)

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 CSD at 519-824-4120 ext. 56208 or email csd@uouelph.ca or see the website: [Student Accessibility Services](#).

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:

[Academic Misconduct](#)

E-mail communication

As per university regulations, all students are required to check their University of Guelph e-mail account regularly: e-mail is the official route of communication between the University and its students.

Drop Date

The last date to drop one-semester Fall 2015 courses, without academic penalty is Friday November 6, 2015. For regulations and procedures for dropping courses see the Undergraduate Calendar: [Undergraduate Calendar - Dropping Courses](#)

Copies of out-of-class assignments

Keep paper and electronic 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 in any electronic media without the permission of the presenter, whether the lecture or lab instructor, a classmate or a guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted. Students are asked not to use cameras and / or cell phones in the lab.

Grading

If you are absent from class during the semester, you will be expected to make up missed lecture and laboratory material on your own. Attendance and participation in the laboratories is mandatory. Each student must attend and participate in the whole lab exercise to get credit for the assignment from that lab.

No extension on lab reports. Any assignment received after 2:30 pm on the due date is late. Late assignments will receive a penalty of 25% of the assignment value per day, including the date due, to a maximum of 2 days.

Please read "LAB RULES" section of your Lab Manual for further details and see the undergraduate calendar for further information.

Course evaluation information

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 with 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 website. Login with your e-mail account login ID and password: [Course Evaluations](#)
Instructors do not receive evaluations until the end of the exam period. Furthermore evaluations are anonymous, unless you specifically indicate you want to acknowledge your comments.

General Campus Resources

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](#)

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 [The Learning Commons](#).

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.

[Counselling Services](#)

Student Health Services is located on campus and is available to provide medical attention.

[Student Health Services](#)

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.

[Stress Management and High Performance Clinic](#)

If you have a documented disability or think you may have a disability:

Student Accessibility Services (SAS) can provide services and support for students with a documented learning or physical disability. They can also provide information about

how to be tested for a learning disability. For more information, including how to register with the centre please see:
[Student Accessibility Services](#)