



# ZOO\*4300 Marine Biology and Oceanography

Fall 2019

Section(s): C01

Department of Integrative Biology

Credit Weight: 0.75

Version 1.00 - June 06, 2019

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## 1 Course Details

### 1.1 Calendar Description

This intensive two-week course is held in late August or early September before classes commence for the Fall semester. The course is held at the Huntsman Marine Science Centre, St. Andrews, New Brunswick. The ecology, behaviour, physiology, biochemistry, biomechanics of marine plants and animals will be studied as well as basic oceanographic techniques. Students will be able to familiarize themselves with the techniques and equipment involved in various branches of marine biology and oceanography. In addition to regular tuition fees, students are responsible for the cost of transportation to St. Andrews, and for charges levied by the Huntsman Marine Science Centre for room and board. These fees are paid to Student Finance and Awards of the University of Guelph. A department application form must be submitted for approval before course selection. The signature of the course coordinator is required to select the course. This course must be recorded as part of your Fall course selection and tuition and compulsory fees will be calculated accordingly. Students taking this course DO NOT use course numbers reserved for Ontario Universities Program in Field Biology.

**Pre-Requisites:** BIOL\*3450, ZOO\*2700

### 1.2 Course Description

This is an immersive field biology experience and students are expected to participate in all elements of the experience. Aspects of the ecology, behaviour, physiology, biochemistry and genetics of marine organisms will be studied as well as basic oceanographic techniques. The course is divided into 2 weeks with different activities. In week 1, students will perform group exercises to study community structure in various intertidal environments as well as boat cruises to collect plankton, benthic invertebrates, marine fish and to observe marine mammals. In week 2, students will perform independent research projects on a subject of their choice (contingent on instructor approval). The course provides excellent opportunities for students to familiarize themselves with the major coastal communities and techniques

used to study coastal marine biology and oceanography. Note that all research is performed within an ecological context that must be explicit. This means that the research goals of independent research projects must always be presented within an ecological context of how the organism operates within the estuarine or intertidal environment.

### 1.3 Timetable

Lectures / Labs / Field trips - Take place **August 3-17, 2019** at the Huntsman Marine Science Centre, St. Andrews, NB.

Student research proposals and reports are due outside of this interval as shown in "Assessments".

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						<b>3</b> Arrival – beginning of course
<b>4</b> Indian Point (Group Exercise #1)	<b>5</b> Bar Road (Group Exercise #2)	<b>6</b> Green's Point (Group Exercise #3)	<b>7</b> Benthic Trawl (Group Exercise #4)	<b>8</b> Plankton Haul (Group Exercise #5)	<b>9</b> Whale Watch (Group Exercise #6)	<b>10</b> Independent Research Projects
<b>11</b> Independent Research Projects	<b>12</b> Independent Research Projects	<b>13</b> Independent Research Projects	<b>14</b> Independent Research Projects	<b>15</b> Independent Research Projects	<b>16</b> Clean- up/Packing Day	<b>17</b> Departure – end of course

### 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

### 2.1 Instructional Support Team

<b>Instructor:</b>	Jim Ballantyne
<b>Email:</b>	jballant@uoguelph.ca
<b>Telephone:</b>	+1-519-824-4120 x52708
<b>Office:</b>	SSC 3465
<b>Course Co-ordinator:</b>	Sarah Schorno
<b>Email:</b>	sschorno@uoguelph.ca
<b>Telephone:</b>	+1-519-824-4120 x56557
<b>Office:</b>	SSC 2475
<b>Lab Technician:</b>	Matt Cornish
<b>Email:</b>	mcornish@uoguelph.ca
<b>Telephone:</b>	+1-519-824-4120 x52714
<b>Office:</b>	HAQL 140

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## 3 Learning Resources

### 3.1 Required Resources

#### **ZOO\*4300 - Field Manual (Lab Manual)**

Field manuals will be distributed to students upon arrival in St. Andrew's, NB.

### 3.2 Recommended Resources

#### **Ecology of aquatic systems (Textbook)**

2ed.; M. Dobson and C. Frid 2009, particularly chapters 4 & 5 (textbook of BIOL\*3450).

#### **Seashore life of eastern Canada (Textbook)**

A guide to identifying intertidal marine species. J. Cornall & G. Simard. Nimbus Pub. Ltd. 2014. ISBN 978-1-77108-182-5 (can be purchased through Amazon)

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## 4 Learning Outcomes

### 4.1 Course Learning Outcomes

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

#### 1. Conceptual Goals

1. Explain how properties of environmental gradients govern life in estuaries

- and across the intertidal shoreline zone.
2. Explain the role that tides play in causing environmental gradients to fluctuate in space and time in estuaries and across the intertidal shoreline zone.
  3. Explain the origins of soft sediments that dominate in estuary ecosystems; how inputs of detritus from external ecosystems rather than local primary productivity make estuaries one of the most productive ecosystems on earth; and why most estuarine invertebrates are generalist deposit feeders.
  4. Recognize that most top predators are highly mobile in estuaries and on intertidal shorelines and how this influences energy flow and species distributions in the system.
  5. Discuss how habitat heterogeneity, fluctuating salinity and species interactions govern the distribution and abundance of organisms in estuarine and shoreline habitats.
  6. Observe real animals (alive or dead) or their component parts to pose questions about form and function that motivate self-directed research leading to enhanced understanding of process in animal biology.

## **2. Skills Goals**

1. Practice rigorous data collection and recording skills in the field for subsequent analysis.
2. Gain experience at proper techniques for handling live animals and tissues that minimize stress and so improve the accuracy and reliability of observation.
3. Distinguish mechanistic research (why/how is it there?) from descriptive research (who/what is there?).
4. Apply the scientific method, and gain facility with making observations, sampling techniques, and hypothesis and prediction development.
5. Use your understanding of ecological and/or physiological processes from prior courses to create a research study that advances understanding about an ecological/physiological processes in a local natural system or organism.
6. Critically evaluate the scientific and societal value of potential research questions.

7. Analyze scientific literature in order to motivate and contextualize your research question, hypotheses and conclusions.
  8. Incorporate uncertainty during the design and implementation of a research study. This means measuring, testing, accounting for, and acknowledging uncertainty throughout the scientific process.
  9. Use prior knowledge from statistics courses to summarize, compare and communicate patterns in collected data and evaluate the quality of evidence. Extract, interpret and/or create complex graphical information that represents important physical and chemical properties of aquatic environments and use these to infer important processes that structure these ecosystems.
  10. Practice logic- and evidence-based approaches to reach defensible conclusions.
  11. Collaborate to answer research questions.
  12. Communicate science effectively by speaking and writing about your original research contribution.
  13. Practice writing 'with the reader in mind', including mastery of structural and grammatical tools to effectively communicate the rationale and importance of your study, and the implications of your findings.
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## 5 Teaching and Learning Activities

### 5.1 Lecture

**Topics:** Lectures will take place daily around 1800 on various topics including sampling for diversity and abundance; the soft intertidal, rocky intertidal and mixed intertidal; benthic trawling; and the pelagic water column.

### 5.2 Lab

**Topics:** Group lab/field exercises (as outlined in the Field Manual) will take place daily during the first week of the course

Individual research projects will be conducted in the lab/field during the second week of the course

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## 6 Assessments

### 6.1 Marking Schemes & Distributions

(All evaluation components address all learning outcomes)

Project Proposal: 5%

Participation: 5% (Participation in field exercises, research and clean-up)

Group Project: 40%

Individual Project: 50%

This IS a senior research related course and so students are expected to demonstrate participation, attention to detail and scientific understanding at the 4000 credit level. Assessment is based on students practicing effective data collection and recording, organizational, collaborative and synthetic skills that combine your understanding of what you see with what you have learned in all prior biology courses. The A-student will be able to provide credible arguments that causally link disparate physical and chemical processes at different scales to biological effects at the level of the organism or of ecology.

### 6.2 Important Dates

June 14	Project proposals due to Courselink Dropbox (by 11:59PM)
Aug. 3	Arrival at St. John NB airport (or independent arrival at Huntsman marine labs)
Aug. 3	Evening. Field course starts with first meeting 18:00 hrs.
Aug. 15	All individual project work completed. Borrowed equipment returned.
Aug. 16	Clean up day
Aug. 17	Vacate dorm rooms by 12:00. Leave the keys!
Sept. 30 11:59PM)	Independent project and Group projects due to Courselink Dropbox (by

### 6.3 Course Expectations

'Live each day as if it is your last, learn as if you'll live forever.' M. Ghandi

This is an immersive field biology experience and students are expected to participate in all aspects of the course and to work collaboratively, as necessary even after hours. Students who do not sufficiently engage with the course may be asked to leave (at their expense). Days will frequently start before 6 AM and end after 11PM. Expect to work very hard while on course to complete our work.

Field work will be carried out regardless of outside weather conditions (except in the case of extreme weather). Be prepared in the field with appropriate clothing to stay dry, warm and hydrated.

Effective data collection and observations in the field is difficult but necessary. Always bring and USE your field book to record observations that you will need for writing reports. Take photographs with your cellphone to help remember local conditions.

Intertidal shoreline excursions: Be prepared for mud in sediment dominated habitats (bring boots). On rocky shorelines, be prepared for extremely slippery surfaces and wave surges. Mixed rocky and sediment shorelines will have both challenges.

Falling on a rocky shoreline risks cuts especially to hands (gloves can be useful and sturdy pants are recommended). Be aware of others (to help) and do not wander off alone.

Boat excursions: Be prepared for ocean swell that can cause nausea. Boat decks are frequently wet and slippery especially during sampling. Benthic trawls involve heavy machinery run by the deck crew. Be aware of what is going on around you, stay out of the way of the machinery and obey all crew commands.

Huntsman marine lab rules will be provided on arrival. Students are expected to abide by these.

You will be collecting animals both for general use and for your particular use in your research. You will treat all animals with care.

- Animals for general AND your specific research use will be returned to the Huntsman lab where you will help with arranging their housing under instructor supervision.
- Animals for your specific research use must also be cared for by you during the period of use (including monitoring water conditions, feeding, removal and disposal of dead or dying animals, etc.). You are responsible for your animals. Please consult with instructors if uncertain.

We will use a variety of standard sampling methods but not all habitats are easy to sample for their organism. Depending on circumstances, some of these methods unavoidably result in animal by-catch and even death (especially benthic trawling).

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## 7 Course Statements

## 7.1 Use of Animals in Teaching

The University of Guelph 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 Animal Care Policy and Procedures (<http://www.uoguelph.ca/research/for-researchers/ethics-and-regulatory-compliance/animals>). Of course, students will be expected to bring a high standard of care for collected animals.

## 7.2 Sexual Harassment/Violence Policy

Read University of Guelph policies and protocols relating to sexual assault, sexual violence and partner violence.

<https://www.uoguelph.ca/sexualviolence/policies>

If you have concerns at any time during the field course you are encouraged to make a course instructor aware of your concerns. You may also contact the university directly if you are uncomfortable speaking with an instructor.

# 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.uoguelph.ca/~ksomers/>

## 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>

### 9.3 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 course registration are available in the Undergraduate and Graduate 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>

## 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 book their exams at least 7 days in advance and not later than the 40th Class Day.

More information can be found on the SAS website

<https://www.uoguelph.ca/sas>

## 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>

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