



ZOO*3700 Integrative Biology of Invertebrates

Fall 2022

Section(s): 01

Department of Integrative Biology

Credit Weight: 0.50

Version 1.00 - September 07, 2022

1 Course Details

1.1 Calendar Description

This course explores variation in physiology, reproduction and life history among invertebrates, and the role of invertebrates in marine, freshwater and terrestrial ecosystems. Through field experiences, lab study and a class experiment, we will examine the diverse solutions that invertebrates have evolved to live in very different environments, including: circulation and gas exchange; feeding and digestion; osmoregulation and excretion, nervous system and sensory structures; locomotion and biomechanics, and invertebrate communities.

Pre-Requisites: ZOO*2700

1.2 Course Description

In the prerequisite for this course, ZOO*2700, you learned about the unity and diversity of invertebrate taxa in an evolutionary context. In this course, you will explore a variety of functional and ecological concepts that will illuminate the biology of invertebrates in far greater depth. The course is organized around a series of major biotic and abiotic "challenges" that invertebrates face and how they overcome these challenges using physiological and developmental mechanisms. This course will help you build a solid foundation of knowledge of invertebrate diversity, ecology, and function (physiology, development, and life history) that you will build upon in higher-level courses. You will also have the opportunity to develop critical skills such as scientific writing, oral presentations, critical reading of primary literature, and methods of scientific inquiry.

1.3 Timetable

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

Lectures will take place in person Monday and Friday 9:30-10:20 AM in Landscape Architecture Room 204. Wednesday's lecture time will be dedicated time for students to work on the class discussion assignments.

Labs are scheduled TUES 2:30-5:20, WED 10:30-1:20, WED 2:30-5:20 in SSC 2314. Labs will be completed in person.

Please note that the above plan is based on current public health directives, and this is subject to change according to public health conditions at the time that the course is offered. Specifically, in-person lecture and lab activities may be converted to synchronous, remote sessions if needed.

1.4 Final Exam

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

2 Instructional Support

2.1 Instructional Support Team

Instructor:	Shaylah Tuttle-Raycraft
Email:	stuttle@uoguelph.ca
Telephone:	519-824-4120 X 58096
Office:	SSC 2502
Office Hours:	Virutally by appointment

3 Learning Resources

3.1 Required Resources

Invertebrates (Textbook)

Brusca RC, Moore W, Shuster SM. Invertebrates, 3rd ed. Sinauer.

OR

Brusca RC, Giribet G, Moore W. Invertebrates, 4th ed. Sinauer.

Electronic Version Available for Rental from the Bookstore:

<https://www.campusbookstore.com/integration/AccessCodes/default.aspx?permalinkId=525113B1-D069-4773-B09B-DA9988CB52A4&frame=YES&t=permalink>

Courselink (Website)

<https://courselink.uoguelph.ca>

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 ZOO*3700. Please check it regularly.

PEAR Review System (Website)

<https://peartool.opened.uoguelph.ca/>

Automatic access from courselink

Dissection Kit (Equipment)

Dissection kits are available from the University of Guelph bookstore for those students who have not needed to purchase one in the past. If you purchased one for a previous course, please use that kit for our course (you do not need a new one).

Zoom (Software)

<https://zoom.us>

Students registered in the course must register for a free basic Zoom account in order to attend virtual office hours/ one-on-one meetings with instructor and help sessions.

Please visit <https://zoom.us> to register for a free basic Zoom account using your University of Guelph email address (Gryphmail).

Spreadsheet and Word Processing Software (Microsoft Office) (Software)

Students are required to have access to spreadsheet and word processing software that are compatible with Microsoft Word and Excel. It is highly recommended that students have access to the Microsoft Office software suite in order to easily complete course assignments.

- These programs are available to download for free from the Computing and Communication Services (CCS) website.
- If students use other similar software, please ensure that you save your files in the required file format according to the assignment instructions.

3.2 Recommended Resources

Invertebrate Zoology: A Functional Evolutionary Approach (Textbook)

Ruppert EE, Fox RS, Barnes RD. Invertebrate Zoology: A Functional Evolutionary Approach, 7th ed. Thomson.

On reserve.

The Invertebrates: A Synthesis (Textbook)

Barnes RSK, Calow P, Olive PJW, Golding DW, Spicer JI. The Invertebrates: A Synthesis, 3rd ed. Blackwell Science.

On reserve.

4 Learning Outcomes

4.1 Course Learning Outcomes

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

1. Differentiate major patterns by which invertebrates carry out critical functions such as:
 - Gas exchange and circulation
 - Water regulation, ion regulation, and excretion
 - Nutrition and digestion
 - Sensing and responding to the environment
 - Interacting with the physical environment and locomotion
 - Reproduction and development
 - Have advanced knowledge of major life-history patterns and their evolution
 - Finding food and avoiding predators and parasites
2. Discuss the mechanisms that led to the diversity of these patterns, including the process of natural selection.
3. Identify the ecological roles played by key groups of invertebrates
4. Identify and classify invertebrates using practical skills
5. Prepare and communicate scientific ideas, including:
 - Scientific writing
 - Oral communication
6. Formulate research questions by practicing the process of biological inquiry using the scientific method including testing predictions of falsifiable hypotheses.

5 Teaching and Learning Activities

5.1 Course Content

The lab and lecture components of this course are inseparable and it will be very difficult for you to succeed in this course if you neglect either of them. Lectures will take place in person and attendance is strongly recommended. In the case of missed lectures, content will be posted for review. Note: Lectures will not be recorded.

Labs will consist of a combination of self-directed review material and hands-on activities in the lab room/field setting. Each week, students will complete a lab worksheet in groups to assess their understanding of the lab content. Success in the lab relies heavily on coming to lab prepared, and working through all the content presented.

5.2 Schedule

Please note that the below schedule and list of important dates are tentative and may be subject to change.

Week	Date (week of)	Lecture Topic	Lab Topic
1	Sep 8	Course overview	
2	Sep 12	Plankton	1. Zooplankton and Reynolds Number
3	Sep 19	Reproduction and Life History	2. Terrestrial Invertebrates
4	Sep 26	Reproduction and Life History	3. Class Experiment Part 1 - Hypothesis and prediction, Experimental Design
5	Oct 3	Gas Exchange, Circulation and Excretion	4. Class Experiment Part 2 - Data collection, Results and Analysis
6	Oct 10	Fall Break - No classes this week	No labs
7	Oct 17	Feeding, Nutrition and Digestion	5. Class Experiment Stats
8	Oct 24	Parasitism	6. Gas Exchange /Respiration
9	Oct 31	Sensing and Responding	7. Nutrition and Digestion
10	Nov 7	Coevolution Predator-prey interactions	8. Sensing and Responding

Week	Date (week of)	Lecture Topic	Lab Topic
11	Nov 14	Locomotion	9. Article selection & presentation work period
12	Nov 21	Invertebrate Conservation	10. Oral/Video Presentation
13	Nov 28	Review	No Labs

5.3 Important Dates

Date	Event	Time / Location
Sep 9	First Meeting	LA 204
Sep 13/14	First labs	SSC 2314
Oct 11	Fall study break	
Oct 28	Lab report – first draft due	Online by 11:00 PM
Nov 4	Lab report – peer review due	Online by 11:00 PM
Nov 14	Lab report – final version due	Online by 11:00 PM

6 Assessments

6.1 Assessment Details

Class Discussion Board (15%)

Date: Online

Learning Outcome: 1, 2, 3, 4, 5, 6

Students will participate in 3 class discussions centered on topics in invertebrate biology. Each assignment will require 1 original post and 1 response to be written by each student.

These are individual assignments.

Each discussion assignment is worth 5% of the final grade.

Weekly Online Quizzes via Courselink (15%)

Date: Online

Weekly quizzes will be given in place of a midterm for this course. The intention of the quizzes is for students to test their comprehension of course content and prepare for the types of questions that will be asked on the final exam.

The quizzes should be completed individually.

The lowest quiz score will be dropped.

Final Exam (20%)

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

The final exam will be written during the final exam period and will cover lecture material. The exam may consist of multiple choice questions, short answer, and longer essay questions. If a student misses the final exam, a request for academic consideration including documentation must be submitted to the Program Counsellor within 5 working days of the missed exam.

Lab Worksheets (20%)

Date: Weekly, In lab

Learning Outcome: 1, 2, 3, 4, 5, 6

To be completed in groups for each of the five lab exercises.

Lowest score of the 5 worksheets will be dropped.

Lab Report (20%)

Learning Outcome: 5, 6

First Draft (5%) - due October 28, 2021

Peer Review (5%) - due November 4, 2021

Final Copy (10%) - due November 14, 2021

The report will consist of a formal write-up of an experiment that we will plan and carry out together as a class. We have reserved two full weeks of lab for the execution of your experiment. The assignment consists of several components including a first draft, final draft and peer review. Students will work in pairs to submit the first draft and final report.

Students will complete the peer review individually.

Late submissions will be penalized 20% each day that they are late. First drafts of the report submitted after the deadline will not be peer-reviewed. Students who submit the first draft late (or do not submit) will not be able to review the paper of another student, and will thus forfeit the marks for the peer-review portion of the assignment.

Presentation (10%)

Date: In lab

Learning Outcome: 1, 2, 3, 5

To be completed in groups. Students will present a recent article of their choice that focuses on some aspect of invertebrate biology.

6.2 Note

Assessment standards for this course follow the definitions given in the University of Guelph 2022-2023 Undergraduate Calendar.

7 Course Statements

7.1 Use of Animals

This course uses selected invertebrates for dissection. The University is committed to principles of conducting research and teaching in accord with the highest ethical standards. 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 ensuring that the animals used 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, consult the [University Animal Care Policy](#).

7.2 Missed Lectures & Labs

If you are absent from lectures or labs during the semester, you will be expected to make up the missed material on your own. Please do not come to class or lab if you are ill.

7.3 Missed Final Exams

Final Exam: If a student misses the final exam, a request for academic consideration including documentation must be submitted to the Program Counsellor within 5 working days of the missed exam.

7.4 Late Policy

Late submissions will be penalized 20% each day that they are late.

Lab Report and Peer Review: First drafts of the report submitted after the deadline will not be peer-reviewed. Students who submit the first draft late (or do not submit it) will not be able to review the paper of another student, and will thus forfeit the marks for the peer-review portion of the assignment.

7.5 Extension Policy

Requests to the Instructor for short extensions may be considered, but only if they are made **at least 24 hours before the submission deadline**. Please note that extensions are not guaranteed, and will not be granted for the First Draft of the Lab Report.

7.6 Regrading Policy

All requests for re-grading **MUST** be made by email to the course instructor within one week of the return of the assignment.

In order for a re-grading request to be considered, the student must provide a justification for why the grade should be changed based on the assessment criteria found in the grading rubric.

Be aware that the entire document will be re-graded, which could result in an increase, decrease, or no change to your mark.

7.7 Online Behaviour (Netiquette)

Inappropriate online behaviour will not be tolerated. Examples of inappropriate online behaviour include:

- Posting inflammatory messages about your instructor or fellow students
- Using obscene or offensive language online
- Copying or presenting someone else's work as your own
- Adapting information from the Internet without using proper citations or references
- Buying or selling term papers or assignments
- Posting or selling course materials to course notes websites
- Having someone else complete your quiz or completing a quiz for/with another student
- Stating false claims about lost quiz answers or other assignment submissions
- Threatening or harassing a student or instructor online

- Discriminating against fellow students, instructors and/or TAs
- Using the course website to promote profit-driven products or services
- Attempting to compromise the security or functionality of the learning management system
- Sharing your user name and password
- Recording lectures without the permission of the 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.selfregulationskills.ca/>

8.4 Personal information

Personal information is collected under the authority of the University of Guelph Act (1964), and in accordance with Ontario's Freedom of Information and Protection of Privacy Act (FIPPA) <http://www.e-laws.gov.on.ca/index.html>. This information is used by University officials in order to carry out their authorized academic and administrative responsibilities and also to establish a relationship for alumni and development purposes.

For more information regarding the Collection, Use and Disclosure of Personal Information policies please see the Undergraduate Calendar. (<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/intro/index.shtml>)

8.5 Course Offering Information Disclaimer

Please note that course delivery format (face-to-face vs online) is subject to change up to the first-class day depending on requirements placed on the University and its employees by public health bodies, and local, provincial and federal governments. Any changes to course format prior to the first class will be posted on WebAdvisor/Student Planning as they become available.

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>

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions

<https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml>

9.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic 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>

Associate Diploma Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.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 make a booking at least 14 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time.

For Guelph students, information can be found on the SAS website

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

For Ridgetown students, information can be found on the Ridgetown SAS website

<https://www.ridgetownc.com/services/accessibilityservices.cfm>

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>

9.9 Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings, changes in classroom protocols, and academic schedules. Any such changes will be announced via CourseLink and/or class email.

This includes on-campus scheduling during the semester, mid-terms and final examination

schedules. All University-wide decisions will be posted on the COVID-19 website (<https://news.uoguelph.ca/2019-novel-coronavirus-information/>) and circulated by email.

9.10 Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g.. final exam or major assignment).

9.11 Covid-19 Safety Protocols

For information on current safety protocols, follow these links:

- <https://news.uoguelph.ca/return-to-campusess/how-u-of-g-is-preparing-for-your-safe-return/>
- <https://news.uoguelph.ca/return-to-campusess/spaces/#ClassroomSpaces>

Please note, these guidelines may be updated as required in response to evolving University, Public Health or government directives.
