DALHOUSIE UNIVERSITY

Faculty of Science Course Syllabus (Section A)
Department of Biology

BIOL/MARI 3301.03
Invertebrate Biology
Winter 2023

Dalhousie University is located in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq. We are all Treaty people.

We acknowledge the histories, contributions, and legacies of the African Nova Scotian people and communities who have been here for over 400 years.

Instructor: C. Isabelle Aubé; isabelle.aube@dal.ca; LSC 2123; in-person/Teams office hrs M: 12-1 pm

Lectures: MWF, 10:35-11:25am, Henry Hicks 212

Laboratories: B01 (W 11:35 am-2:25 pm), B02 (W 2:35-5:25pm); B03 (R 11:35am-2:25pm); LSC 2102

Tutorials: None

Course Delivery: In-person, synchronous live lectures, with recordings made available afterwards. Self-directed, in-person open lab format.

COVID-19 Masking and Isolation protocols: https://www.dal.ca/covid-19-information-and-updates.html

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Course Description

A survey of the diversity, ecology, and evolutionary history of the major invertebrate groups. Lectures will emphasize phylogenetics and diversity of body plans. Labs will emphasize identification and anatomy through dissections and observations.

Course Prerequisites

BIOL 2003.03 (Animal Diversity)

Course Exclusion

BIOL 3321X/Y.06

Learning Objectives

Picking up from BIOL 2003, you will learn many things in BIOL/MARI 3301. By the end of this course, you should be able to:

- Correctly identify all of the Metazoan invertebrate phyla when presented with a specimen and describe the unifying characteristics of that phylum.
- Describe the anatomy of invertebrates using scientific language.
- Safely handle and observe live and preserved invertebrate specimens through microscopy and dissections.
- Understand the process of evolution by natural selection, the phylogeny of invertebrate groups, and the terms used to describe specific concepts in phylogeny such as synapomorphies or crown groups.

- Critically examine scientific literature through prepared annotated bibliographies and a term-long group oral presentation.
- Examine how human culture has historically been influenced and continues to be influenced by invertebrates.
- Acquire a new curiosity and appreciation for the invertebrate life around us!

Course Materials

Textbook

Brusca RC, Giribet G, Moore W. 2023. Invertebrates. 4th Ed. New York (NY): Oxford University Press. 1088 p.

Available for purchase as a paper or e-textbook (full copy or 180-day subscription) through the Dal Bookstore. Also available are two free paper textbook copies on reserve and an e-copy on short-term loan at the Killam Library.

Brightspace:

All Lecture and Laboratory course materials, including PowerPoint slides, video links, and reading materials will be made available to students via our Brightspace course page.

Brightspace will also be our communication hub for the course regarding announcements, cancellations, deadlines, assignment submissions, grades, and any other pertinent resources.

Laboratory Equipment:

- A **lab coat** and **closed-toed shoes** are required for each lab.
- You will be required to wear a **mask**, as per Dal's COVID-19 regulations.
- Vinyl **gloves** will be provided in lab if needed.
- You do not need to purchase a Lab Manual for this course. E-copies of each lab assignment will be available in the Lab Module in Brightspace, and printed copies will be available for reference in lab.
- However, you will need to bring a paper **notebook** to keep detailed notes and drawings in the lab. The use of e-notebooks is at your own risk as they may get wet, dirty, and/or damaged.
- You may bring to lab your smart phone/**camera** to take photographs of the specimens and/or other digital devices to support your learning. Again, this is at your own risk as they may get wet, dirty, and/or damaged.
- You will need access to a **digital camera and/or scanner** to insert lab drawings/photos in your online lab assignment submissions. You may borrow a camera (and other equipment) and/or scan images through the Killam Library.

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Course Assessment

Component	Weight (% of final grade)	Date (see schedule)
Midterm Exam 1 (in class) *Covers Lectures 1-10*	*15%*	*Mon Feb 13*
Midterm Exam 2 (in class) *Covers Lectures 11-19*	*15%*	*Wed Mar 15*
Final Exam (in person, location TBD) *Cumulative, covers Lectures 1-29*	*30%*	*Scheduled by the Registrar*
Lab Assignments (submitted online by 11:59 pm)		***Wed (B01 & B02)/Thurs (B03)***
***Lab 1:** Introduction & Treasure Hunt*	*3%*	*Jan 25/26*
***Lab 2:** Sponges & Cnidarians*	*3%*	*Feb 1/2*
***Lab 3:** All the Small Things*	*3%*	*Feb 8/9*
***Lab 4:** Molluscs*	*3%*	*Feb 15/16*
***Lab 5:** Annelids*	*3%*	*Mar 1/2*
***Lab 6:** Crustaceans*	*3%*	*Mar 8/9*
***Lab 7:** Insects & Spiders*	*3%*	*Mar 15/16*
***Lab 8:** Echinoderms*	*3%*	*Mar 22/23*
Term-long Project		
Sign up for group invert topic	*No marks*	*Mon Jan 30*
***Annotated bibliography 1** (self)*	*3%*	*Mon Feb 6*
***Annotated bibliography 2** (group)*	*3%*	*Mon Mar 6*
***Oral Group Presentations** (during lab time)*	*10%*	*Mar 29/30 & Apr 5/6*

Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale

A+ (90-100)	**B+** (77-79)	**C+** (65-69)	**D** (50-54)
A (85-89)	**B** (73-76)	**C** (60-64)	**F** (<50)
A- (80-84)	**B-** (70-72)	**C-** (55-59)	

Course Policies related to Academic Integrity

- You may collaborate with others while working on your assignments; however, **you must submit your own unique work that is appropriately referenced**.
- If you collaborate with others to obtain photographs in the lab, **you must credit the person who took the photo.**
- If an Academic Integrity offence is suspected (e.g., plagiarism or cheating), the case will be forwarded directly to a 3rd party Academic Officer as per Dalhousie University guidelines.

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Course Policies on Missed or Late Academic Requirements

You are expected to **read the course syllabus in full** and **keep track of all the deadlines**.

You **cannot** use a Student Declaration of Absence (SDA) form for missed Midterms or the Final Exam.

Students with a **Special Accommodations plan must follow their plan's guidelines** to request extensions and/or alternative testing arrangements.

Midterm Exams and Final Exam

- Contact your Instructor (isabelle.aube@dal.ca) if you have a reasonable excuse for missing any Midterms or the Final Exam, or else you will automatically receive a grade of **zero**.
- There will be **no make-ups** for missed Midterm Exams. If the reason for missing a Midterm Exam is deemed reasonable by the Instructor, the value of that Exam will be added to your cumulative Final Exam.
- A makeup Final Exam ***may*** be scheduled at the end of the term or at the start of the next term, on a case-by-case basis.

Labs

- Lab attendance is **mandatory**, but since these are **self-directed open-labs**, you are not required to stay for the full period.
- If you have a reasonable excuse for missing a lab, contact your instructor (isabelle.aube@dal.ca), or else you will automatically receive a grade of **zero**.
- There will be **no make-up labs**, but you ***may*** have the option to attend another lab section that week, or have up to a **maximum of 2 missed labs** pro-rated upon the Instructor's discretion.

Assignments

- The deadline to **submit your lab assignment online is by 11:59 pm on your designated lab day**. You will have plenty of time to complete your lab assignment within your designated 3-hr lab period. Therefore, a wise time-management strategy would be to submit it then rather than risk missing the deadline later.
- If you are unable to complete an assignment by its deadline, you can submit a **Student Declaration of Absence (SDA)** form to allow an **automatic extension of no more than 72 hours (3 days)** without the need for a reasonable excuse. Your SDA must be submitted no more than 72 hours past the deadline for that specific assessment. A **maximum number of 2 SDA forms** will be allowed for this course.
- For group assignments, **each member of the group is required to submit a copy online** so we can auto-create a link to your Brightspace gradebook.
- If you require any additional extensions, or an extension that is longer than 72 hours, you (or someone else on your behalf) must contact your Instructor (isabelle.aube@dal.ca) as soon as reasonably possible.
- Assessments submitted past the deadlines without an SDA or special permission from the Instructor will receive **a 10% deduction per day late** (including weekends).

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General Tips to Ace Inverts!

First off... hopefully, you WILL ace inverts! That being said, I have a couple of tips on how you can make this class go smoothly:

- **Attend in-person Lectures**, even if you're late. This is the BEST use of your time (and mine!) to focus on the material with me. Lecture recordings are meant to aid in your learning if needed, but keep in mind that being overly reliant on Lecture recordings is time wasted.

- **Ask questions and ask often**, and not just right before the exams! This means in class, during labs, on the discussion boards, and during my office hours. There are no questions too insignificant or silly. Especially questions about deadlines or expectations! If I don't know the answer, I WILL follow up.

- Pay attention and **think proactively** to what is emphasized in the lectures and labs: clades, anatomy, form/function, life cycles, etc... These are concepts that will appear throughout the course. Ask yourselves: "what would be a good question for an exam on this particular topic?".

- Simply reading and recopying notes over and over is NOT an effective use of your time when it comes to studying. You need to **have a strategy to actively retain** the huge amounts of material that we will be covering in class. The Learning Scientists have 6 Strategies for Effective Learning, pick one or two that you like best. My favourites are Dual Coding and Retrieval Practice.

- **Create a weekly schedule** of all your tasks (school, work, leisure, deadlines) with backup slots in case you need them. Ideally, block out 1-2 hours on or near each of your Lecture days to go over your notes/clarify questions you have/make up practice questions. Schedule a weekly timeslot to **actively study** the material covered that week. **Pro-tip:** Fridays 5-9 pm are an often-forgotten time to study, but you'll be glad you did, and you still have the night to have fun with friends!

- **Form a study group** with other students for review sessions. I've made life-long friendships through my undergrad study groups at Dal!

- **Try not to cram!** This course requires you to think critically, which is harder to do when you're under pressure from multiple deadlines. Think about your project presentation topic early and start saving references.

- **Explore online!** There is a huge community of scientists on twitter and many scientific organizations have some form of social media, and we ALL love to nerd out about Inverts too! I encourage you to share anything interesting or useful with the class on our Discussion Board.

- Finally**, rest, eat well, exercise, and do something fun** once in a while to "recharge your batteries"! I'm still my own worse critic when it comes to this, but I never give up!

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Course Schedule and Content

[1] All lab assignments are submitted online via Brightspace and are due by 11:59 pm on your designated lab day.
[2] All term-long project assignment deadlines (e.g., bibliographies) are due by 11:59 pm on the indicated Mondays. Each member of the group must submit a copy online via Brightspace.
[3] All Midterm Exams are in-class and non-cumulative. Final Exam is schedule by the Registrar and is cumulative.

Date	Lectures	Labs
Week 1 Jan 9 - 13	**Lectures and labs postponed by a week**	
Week 2 Jan 16 - 20	L01 Intro to Inverts I (Ch. 1) L02 Intro to Inverts II, and Systematics, Phylogeny, & Classifications (Ch. 1 & 2) L03 Invert Animal Architecture & Body Plans (Ch. 3)	
Week 3 Jan 23 - 27	L04 Invert Development, Life Histories, & Origin (Ch. 4) L05 Sponges (Ch. 5) L06 Placozoans & Ctenophores (Ch. 6)	**Lab 1:** Intro and Treasure Hunt[1] (3%)
Week 4 Jan 30 – Feb 3	L07 Cnidarians I (Ch. 7) L08 Cnidarians II (Ch. 7) **Feb 3: Munro Day—no classes**	Sign up for term-long group project: **Mon Jan 30**[2] **Lab 2:** Sponges & Cnidarians (3%)
Week 5 Feb 6 - 10	L09 Intro to Bilaterians & Xenacoelomorphs (Ch. 8 & 9) L10 Intro to Protostomes & Gnathifera (Rotifers & Kin) (Ch. 10 & 11) L11 Platytrochozoa, Entoprocts, & Cycliophora, and Intro to Lophotrochozoa (Ch. 12 & 13)	Annotated Bibliography 1 (self): **Mon Feb 6** (3%) **Lab 3:** All the Small Things (3%)
Week 6 Feb 13 - 17	**Feb 13: Midterm Exam 1 (L01-10)[3] (15%)** L12 Molluscs I (Ch. 13) L13 Molluscs II (Ch. 13)	**Lab 4:** Molluscs (3%)
Week 7 Feb 20 - 24	**Study Break—no classes or labs**	
Week 8 Feb 27 – Mar 3	L14 Nemertea, and Annelids I (Ch. 14 & 15) L15 Annelids II (Ch. 15) L16 Annelids III (Ch. 15)	**Lab 5:** Annelids (3%)
Week 9 Mar 6 - 10	L17 Lophophorates (Bryozoa & Kin) (Ch. 13 & 16) L18 Rouphozoa (Platyhelminthes & Kin) (Ch. 17) L19 Intro to Ecdysozoans, and Nematoids (Ch. 18 & 19)	Annotated Bibliography 2 (group): **Mon Mar 6** (3%) **Lab 6:** Crustaceans (3%)
Week 10 Mar 13 - 17	L20 Parnarthropods (Tardigrades & Kin) (Ch. 20) **Mar 15: Midterm Exam 2 (L11-19) (15%)** L21 Intro to Arthropods (Ch. 20)	**Lab 7:** Insects and Spiders (3%)
Week 11 Mar 20-24	L22 Crustaceans (Ch. 21) L23 Hexapods (Insects & Kin) I (Ch. 22) L24 Hexapods (Insects & Kin) II, and Myriapoda (Ch. 22 & 23)	**Lab 8:** Echinoderms (3%)
Week 12 Mar 27 - 31	L25 Chelicerata (Spiders) (Ch. 24) L26 Intro to Deuterostomes & Hemichordates (Ch. 25) L27 Echinoderms I (Ch. 26)	**Oral Group Presentations (10%)**
Week 13 Apr 3 - 7	L28 Echinoderms II (Ch. 26) L29 Invert Chordates (Ch. 27) **Apr 7: Good Friday—no classes**	
Week 14 Apr 10-11	**Mon Apr 10: Review/Backup Day** **Tues Apr 11: Review/Backup Day**	
Exams Apr 13 - 25	**Final Exam (L01-29, cumulative): scheduled by Registrar (30%)**	

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Faculty of Science Course Syllabus (Section B)

University Policies and Statements

This course is governed by the academic rules and regulations set forth in the University Calendar and by Senate

Academic Integrity

At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student, you are required to demonstrate these values in all of the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity.

Information: https://www.dal.ca/dept/university_secretariat/academic-integrity.html

Accessibility

The Advising and Access Services Centre is Dalhousie's centre of expertise for student accessibility and accommodation. The advising team works with students who request accommodation as a result of a disability, religious obligation, or any barrier related to any other characteristic protected under Human Rights legislation (Canada and Nova Scotia).

Information: https://www.dal.ca/campus_life/academic-support/accessibility.html

Student Code of Conduct

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner—perhaps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution.

Code: https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html

Diversity and Inclusion – Culture of Respect

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness

Statement: http://www.dal.ca/cultureofrespect.html

Recognition of Mi'kmaq Territory

Dalhousie University would like to acknowledge that the University is on Traditional Mi'kmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, counsel and support. Visit or e-mail the Indigenous Student Centre (1321 Edward St) (elders@dal.ca).

Information: https://www.dal.ca/campus_life/communities/indigenous.html

Important Dates in the Academic Year (including add/drop dates)
https://academiccalendar.dal.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&catalogid=117&chapterid=-1&topicgroupid=31821&loaduseredits=False

University Grading Practices

https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html

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Faculty of Science Course Syllabus (Section C)

Student Resources and Support

Advising

General Advising https://www.dal.ca/campus_life/academic-support/advising.html

Science Program Advisors: https://www.dal.ca/faculty/science/current-students/undergrad-students/degree-planning.html

Indigenous Student Centre: https://www.dal.ca/campus_life/communities/indigenous.html

Black Students Advising Centre: https://www.dal.ca/campus_life/communities/black-student-advising.html

International Centre: https://www.dal.ca/campus_life/international-centre/current-students.html

Academic supports

Library: https://libraries.dal.ca/

Writing Centre: https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html

Studying for Success: https://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html

Copyright Office: https://libraries.dal.ca/services/copyright-office.html

Fair Dealing Guidelines https://libraries.dal.ca/services/copyright-office/fair-dealing.html

Other supports and services

Student Health & Wellness Centre: https://www.dal.ca/campus_life/health-and-wellness.html

Student Advocacy: https://dsu.ca/dsas

Ombudsperson: https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html

Safety

Biosafety: https://www.dal.ca/dept/safety/programs-services/biosafety.html

Chemical Safety: https://www.dal.ca/dept/safety/programs-services/chemical-safety.html

Radiation Safety: https://www.dal.ca/dept/safety/programs-services/radiation-safety.html

Scent-Free Program: https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html

Dalhousie COVID-19 information and updates: https://www.dal.ca/covid-19-information-and-updates.html