

Faculty of Science Course Syllabus
Department of Biology
MARI/BIOL 3301
Invertebrate Biology
Winter 2017

Lecture:	<i>Jen Frail-Gauthier</i>	<i>jfrail@dal.ca</i>	<i>LSC 5126</i>
Laboratory:	<i>Christine Angelidis</i>	<i>christine.angelidis@dal.ca</i>	<i>LSC 6078</i>
Lectures:	<i>M W F 12:35-1:25</i>	<i>LSC 206</i>	
Laboratories:	<i>B01: 2:35 Thursdays</i> <i>B02: 12:35 Thursdays</i>	<i>LSC 2102 (by the touch tanks)</i>	

Teaching Assistants: *Gabrielle Picard and Troy Palmer*

Course Description

This class is taught mostly from an evolutionary perspective (including molecular phylogeny), with ecology, form and function, and even paleontology. Instead of being taught from the “earliest invertebrates” to the “most vertebrate-like invertebrates” chronology, this course is taught in major evolutionary groups and patterns. You will have to use your previous BIOL 2003 knowledge to help with the backbone nuts and bolts. By the end of the semester, you will all be invertebrate zoologists. Pretty cool, huh?

This is an intense course, with a lot of information. You will have to memorize, but most importantly, understand. The bulk of your grade will come from being able to understand, analyze, evaluate and process information about invertebrate ecology and evolution... look for main connections, and look for WHY and HOW things are the same/different--- whether it's the animals' form and function or their evolution and phylogeny.

Course Prerequisites

BIOL 2003

Course Objectives/Learning Outcomes

Picking up from BIOL 2003, you will learn many things in BIOL 3301. By the end of this course you should be able to (this is not a complete list!):

- ✓ recall, recognize, classify and understand all Metazoan Phyla
- ✓ understand the process of evolution and phylogeny of invertebrates
- ✓ manage a lot of new information (by taking good lecture notes, reviewing frequently, and staying on top of available readings)
- ✓ critically analyze scientific papers (through your annotated bibliography), lectures, and guest talks
- ✓ prepare an oral presentation and annotated bibliographies
- ✓ understand why there are so many hypotheses surrounding invertebrate evolution
- ✓ ...and most importantly, appreciate the extreme diversity and complexity of these invertebrate groups!

Course Materials

No required textbooks: required readings will be posted to Bright Space. These will include articles from the primary literature, commentaries, Science blogs and other news-related web pages. 1-2 hours should be devoted each week to these readings/exploration. All of this information will be essential to integrate into the essay questions for the final exam.

Lectures

Monday Wednesday Friday 12:35 to 1:25, LSC 206

Lectures are available for download on Bright Space. Full lecture PowerPoints will be available AFTER the lecture. BEFORE the lectures, I will have "Pre-Lecture Hot Topics" posted in .doc format (similar to BIOL 2003 if you took it in Fall 2013 -2014). Some lectures will be discussion-based, following assigned readings/explorations. Some lectures may be guests as well!

Labs

Exact schedule will be based on Guest Availability and order may change throughout the semester. For most labs, B02 will not start until 12:35 PM. B01 will still start at 2:35. We will remind you weekly when your lab will start.

Each lab will be an exploration, where guest researchers, professors, students and industry professionals will present information about their specific invertebrate phyla, and have materials available for you to examine in person. It is very important for you to ask questions and participate in the labs. In the weeks where there are no available guest speakers, we will have in-class debates and discussions about some of the big ideas and hypotheses about invertebrate evolution. For a few labs, I have preserved animals for dissection and examination. I will also have some smaller live animals to see in action! At the end of every lab, you will hand in a short critical summary of the information from the guest speaker or the discussion. This will help keep you engaged in the lab and will help develop your critical thinking and scientific communication—very important for future research in Honours and beyond.

Course Assessment

Component	Weight (% of final grade)	Date
<i>Tests/quizzes</i>	15%	Lecture Feb 15 th
<i>Final exam</i>	30%	(Scheduled by Registrar)
<i>Assignments</i>	55%	See details below

Assignment Evaluation Details (55%)

Invertebrate Term Project (science literacy, academic writing, oral presentation): 35%

- Composed of three separate parts due at different times
- Information will be on BrightSpace and discussed in the first lab (January 7th) (criteria, instructions, etc.)
- Part 1 Annotated Bibliography due Feb 9th (12%)
- Part 2 Annotated Bibliography due March 16th (12%)
- Part 3 Presentation (11%) – In Lab March 23rd, 30th, April 6th (sign up for TOPIC in 1st lab (January 12th). Presentation order will be determined by the end of February and will be based on topics.

Lab Summaries/Debates (15% total)

Depending on the type of lab (guest speaker, animal examination, dissection...), you will hand in a summary/drawing. Attendance will be taken in every lab. Summaries must be handed in by 11:59 PM of the same day. Guiding questions and criteria will be posted on BrightSpace to help write your summaries. These are not “busy work” assignments: they help you to maintain focus in the lab, and think critically during the guest lecture and lab. They also help in picking out the important information and critically analyzing information given to you. These will be graded on an all-or-nothing basis (details will be posted to BrightSpace). These will be worth 8%. The 7% for the debates will be graded based on content, quality of discussion, and participation. More information will be given before these labs.

Class Participation (5%)

This year, I am able to replace the “Friday Lectures” with REAL lectures. The information in these Friday Lectures were (in my opinion!) really interesting. I am going to use this information and develop lectures around the readings and explorations associated with them. For these lectures, attendance will be recorded and participation in class discussions will also count for your grade. You will know in advance when these discussion lectures will be.

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

Please let me or Christine know as soon as you can if you cannot attend lab/presentation, write a test, or hand in an assignment due to medical or personal reasons.

Extra Pointers to Ace Invertebrate Biology!

The framework that I will use to teach invertebrate zoology is, broadly, evolutionary. I hope by the end of the course that you will have a really good understanding of the evolution of the invertebrates, how organisms with different body plans evolved and who their ancestors might have been. You will get an introduction to paleontology, to evolution, to molecular phylogenetics, to ecology, and to the great and varied diversity of invertebrates on the planet. You will be able to wow your friends by your ability to identify ~97% of the animal life on planet earth!

Here is some advice to make sure you don't get overwhelmed in BIOL 3301!

- ✓ Form a study group with other students for review sessions. Ask for help when you have a question, not just right before the exams. Post questions and topics on BbLearn, or ask during lecture (chances are, if you have a question about a topic, so do other students!)
- ✓ Explore online! Follow science and biology blogs on Twitter (i.e. Scientific American, New Scientist, NOAA, Nature...), watch David Attenborough, search Invertebrate topics in Google and/or Google Scholar regularly! The best way to learn is to be excited about learning—Christine and I'll definitely help with that one! ☺
- ✓ Do the readings! You are given a manageable amount every week. Do not leave them until April!
- ✓ Memorize the phylogeny in “The New View of Animal Phylogeny”. Memorizing is the base of the pyramid, and knowing this phylogeny will help you understand the HOW's and the WHY's of invertebrate evolution.
- ✓ Study throughout the term. You should be reviewing every week at the minimum—don't leave studying for the last minute. Studying should be a REVIEW of material, not learning it for the first time.
- ✓ Think proactively and critically to best prepare yourself for the tests. What are some overall patterns of information you are learning? Themes, body plans, evolution, etc...

Most importantly, come to us if you have any issues! We are approachable and easy to reach. No question is too dumb, no concern is too little. Let's have a great semester!

Course Content

Tentative Class Dates

Topics flow from one lecture to the next; Guest lectures may change dates slightly

Tentative Lab Schedule

Dates subject to change because of guest availability, however, the Annotated Bibliography due dates, midterm, and the presentation dates will not change.

Date	Lecture Topics for the Week	Lab Topic and Assignments
Jan 9 - 13	Introduction, the fossil record and metazoan taxonomy/phylogeny/cladistics	Jan 12 th – Lab introduction and Invertebrate Phyla Exploration
Jan 16 - 20	Porifera and Placozoa	Jan 19 th – Class Discussion/ Exploration 1: The Cambrian Explosion (Sign up for Topic) Discussion/Notes due 11:59 PM (3.5%)
Jan 23 - 27	Cnidaria and Ctenophora	Jan 26 th – Class Discussion/Exploration 2: The First Animal Discussion/Notes due 11:59 PM (3.5%)
Jan 30 – Feb 1	It's all about that Bilateria – basal bilaterians and odd early groups Munro Day February 3rd – no classes	Feb 2 nd – Deuterostomes (echinoderms and chordates) Lab summary due 11:59 PM
Feb 6 - 10	Chaetognatha, the “Protostomes and Deuterostomes”, and the enigmatic “Xenoturbella”	Feb 9 th – Bedford Basin Zooplankton Exploration Annotated Bibliography 1 due beginning of lab 12% Lab summary due 11:59 PM
Feb 13 Feb 15 Feb 17	Deuterostomes --- Ambulacraria (Echinoderms and Hemichordates), Invertebrate Chordates] Midterm in class Wed Feb 15th	Lab Topic TBA
Feb 20– 24	Reading Week --- no classes or labs	Reading Week
Feb 27 – Mar 3	Ecdysozoa – the moulting animals (Non-arthropod Ecdysozoa)	March 2 nd – The “Articulata” group: Crustaceans and Annelids Lab summary due 11:59 PM
Mar 6 – Mar 10	Panarthropoda – Tardigrada, Onychophora, Arthropoda	March 9 th – Shawn Adderley, Little Ray's Reptiles (Arachnids) Lab summary due 11:59 PM
Mar 13 – 17	Crustaceans and Insects	March 16 th – Roger Croll (Molluscs) Annotated Bibliography 2 due start of lab (12%) Lab summary due 11:59 PM
Mar 20 – 24	Lophotrochozoa: Enigmatic groups, Annelids and Allies	March 23 rd - Topic Presentations week 1 (11%)
Mar 27 - 31	Molluscs	March 30 th – Topic Presentations week 2 (11%)
April 3 – 7	Platyhelminthes, Nemertea, and other Lophotrochozoans	April 6 th – Topic Presentations week 3 (11%)
April 10	Last day of class --- review	

April 12th-26th - Final Exam (Scheduled Exam Period)

ACCOMMODATION POLICY FOR STUDENTS

Students may request accommodation as a result of barriers related to disability, religious obligation, or any characteristic protected under Canadian Human Rights legislation. The full text of Dalhousie's Student Accommodation Policy can be accessed here:

http://www.dal.ca/dept/university_secretariat/policies/academic/student-accommodation-policy-wef-sep--1--2014.html

Students who require accommodation for classroom participation or the writing of tests and exams should make their request to the **Advising and Access Services Centre (AASC)** prior to or at the outset of the regular academic year. More information and the *Request for Accommodation* form are available at www.dal.ca/access.

ACADEMIC INTEGRITY

Academic integrity, with its embodied values, is seen as a foundation of Dalhousie University. It is the responsibility of all students to be familiar with behaviours and practices associated with academic integrity. Instructors are required to forward any suspected cases of plagiarism or other forms of academic cheating to the Academic Integrity Officer for their Faculty.

The Academic Integrity website (<http://academicintegrity.dal.ca>) provides students and faculty with information on plagiarism and other forms of academic dishonesty, and has resources to help students succeed honestly. The full text of Dalhousie's *Policy on Intellectual Honesty* and *Faculty Discipline Procedures* is available here:

http://www.dal.ca/dept/university_secretariat/academic-integrity/academic-policies.html

STUDENT CODE OF CONDUCT

Dalhousie University has a student code of conduct, and it is expected that students will adhere to the code during their participation in lectures and other activities associated with this course. In general:

"The University treats students as adults free to organize their own personal lives, behaviour and associations subject only to the law, and to University regulations that are necessary to protect

- the integrity and proper functioning of the academic and non – academic programs and activities of the University or its faculties, schools or departments;
- the peaceful and safe enjoyment of University facilities by other members of the University and the public;
- the freedom of members of the University to participate reasonably in the programs of the University and in activities on the University's premises;
- the property of the University or its members."

The full text of the code can be found here:

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

COPYRIGHT

All members of the Dalhousie community are expected to comply with their obligations under Canadian copyright law. Dalhousie copyright policies and guidelines, including our Fair Dealing Guidelines, are available at

<http://www.dal.ca/dept/copyrightoffice.html>. Copyright questions should be directed to the Copyright Office at copyright.office@dal.ca.

SERVICES AVAILABLE TO STUDENTS

The following campus services are available to help students develop skills in library research, scientific writing, and effective study habits. The services are available to all Dalhousie students and, unless noted otherwise, are free.

Service	Support Provided	Location	Contact
General Academic Advising	Help with <ul style="list-style-type: none"> - understanding degree requirements and academic regulations - choosing your major - achieving your educational or career goals - dealing with academic or other difficulties 	Killam Library Ground floor Rm G28 Bissett Centre for Academic Success	In person: Killam Library Rm G28 By appointment: <ul style="list-style-type: none"> - e-mail: advising@dal.ca - Phone: (902) 494-3077 - Book online through MyDal
Dalhousie Libraries	Help to find books and articles for assignments Help with citing sources in the text of your paper and preparation of bibliography	Killam Library Ground floor Librarian offices	In person: Service Point (Ground floor) By appointment: Identify your subject librarian (URL below) and contact by email or phone to arrange a time: http://dal.beta.libguides.com/sb.php?subject_id=34328
Studying for Success (SFS)	Help to develop essential study skills through small group workshops or one-on-one coaching sessions Match to a tutor for help in course-specific content (for a reasonable fee)	Killam Library 3rd floor Coordinator Rm 3104 Study Coaches Rm 3103	To make an appointment: <ul style="list-style-type: none"> - Visit main office (Killam Library main floor, Rm G28) - Call (902) 494-3077 - email Coordinator at: sfs@dal.ca or - Simply drop in to see us during posted office hours All information can be found on our website: www.dal.ca/sfs
Writing Centre	Meet with coach/tutor to discuss writing assignments (e.g., lab report, research paper, thesis, poster) <ul style="list-style-type: none"> - Learn to integrate source material into your own work appropriately - Learn about disciplinary writing from a peer or staff member in your field 	Killam Library Ground floor Learning Commons & Rm G25	To make an appointment: <ul style="list-style-type: none"> - Visit the Centre (Rm G25) and book an appointment - Call (902) 494-1963 - email writingcentre@dal.ca - Book online through MyDal We are open six days a week See our website: writingcentre.dal.ca