University of Victoria
Biol 322 - BIOLOGY OF MARINE INVERTEBRATES
Jan - Apr 2024 CRN 20364
COURSE SYLLABUS

Lectures: COR A121 Mon & Thu 11:30-12:50 **Laboratory:** Petch 109

Course Instructor: Dr. Amanda Bates
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Senior Lab Instructor: Megan Davies email: mdavies7@uvic.ca
Office hour: TBA – Day and time will be sent out via email.

For any inquiries related to BIOL322, students are encouraged to reach out to the appropriate contacts based on the nature of their concern. If you have questions regarding the course content, please contact Megan. For general concerns about the course or any questions where you are unsure who to ask, kindly contact Megan directly and cc Amanda. Should any concerns arise specifically regarding Megan, please direct those to Amanda. We value open communication and are here to assist you throughout the semester. **To streamline the communication process, please ensure "BIOL322" is included in all email titles.**

GENERAL INFORMATION: This course delves into how selected groups of marine invertebrates have responded to challenges imposed by diverse marine environments throughout the evolutionary history of life on Earth. The outcome has been a proliferation of resourceful strategies aimed at ensuring survival and effective reproduction. Lecture content is structured around adaptation themes, covering areas such as defensive mechanisms (e.g., transparency, bioluminescence, and induced defenses), musculo-skeletal systems (including muscular hydrostats), various feeding systems, nutritional symbioses, reproductive biology, and specific physiological adaptations. Each theme is introduced with important background information, followed by an exploration of specific topics relevant to the theme. Lectures will emphasize studies from the primary research literature. An introductory course in Invertebrate Biology (i.e. BIOL 321 or course equivalent) is a required prerequisite.

LEARNING OBJECTIVES:

- Deepen your understanding of the evolutionary adaptations enabling marine invertebrates to thrive in diverse environments.
- Acquire practical skills in dissecting local invertebrate species.
- Demonstrate proficient and safe laboratory techniques along with detailed biological note-taking for the study of marine invertebrates.
- Strengthen your ability to search for primary research literature on a selected topic and present information in a formal scientific writing style.
- Enhance critical thinking about animal form and function in diverse environments.

LECTURES:

Lectures are scheduled to begin on Monday January 8, 2024. The in- person lectures, together with the PowerPoint slides, will be recorded in class using Echo 360. All the lectures recorded by Zoom and by Echo 360 will be uploaded to the Brightspace site for BIOL 322.

Biology 322 does not use a published textbook, although a general Invertebrate Biology textbook will be a valuable reference. In lieu of a textbook, notes supplementing the lecture material will be available on the Brightspace site for BIOL 322. **However, all material presented in lecture is examinable, even if not covered in the supplementary lecture notes.**

LABORATORY:

Note: The first lab of BIOL 322 will be held Wed Jan 18 or Thu Jan 19, depending on your lab section.

The lab emphasizes observations on form, function, and behaviour of live animals. Morphological studies will involve dissections of heavily anaesthetized or previously frozen animals; only species that are very abundant in coastal waters around southern Vancouver Island will be used for this purpose.

The lab manual for BIOL 322 will be available as a pdf from the Brightspace site for BIOL 322. There will not be a hard copy lab manual.

In brief, the laboratory section of BIOL 322 involves three components:

1) **Discussion Groups.** Groups of 4-5 students will discuss a research paper. Each group will submit a single report of written answers to questions about the paper.

(marks: 2.5%x4 = 10%)

2) **Lab Notebook.** All observations made in the laboratory on the morphology and behaviour of various marine invertebrates will be recorded in a lab notebook. Photos/scans of your lab notebook will be uploaded to the corresponding Brightspace dropbox by 11:59pm the day of your lab. **No late submissions will be accepted.** Note: Lab #4 is worth more marks.

(marks: 1.5%x8, lab#4x5% = 17%)

Students who show exemplary work on 6 out of 9 labs will receive a 2% bonus mark.

3) Comparative Anatomical Study. Students will work in groups of two to study the comparative structure & function of homologous structures in two invertebrates related at a taxonomic rank below the level of phylum. Each student will submit a 'proposal' (marks: 5%), which will outline their intended project, and then a formal report (marks: 18%) after both dissections have been completed. Pairs of animals available for study will be posted on Brightspace. **(total marks: 23%)**

Materials for lab:

1. Lab Manual – bring a digital copy of the lab manual to each lab or just a print-out of the specific lab exercise that will be undertaken during a given lab session.
2. Lab Notebook. Soft or hard cover notebook; lined or blank paper. Binders or file folders containing loose pages are unacceptable.
3. Dissecting Kit. Purchase from the UVic Bookstore or any other supplier; should include fine forceps.

Discussion Groups

Discussion groups can be an effective way of developing and practicing critical thinking skills. You will be assigned to a discussion group consisting of 4 or 5 individuals. The first 45 minutes of four lab periods will be devoted to a group discussion of an assigned research paper. A link to a pdf copy of this paper from the UVic libraries will be available from the Brightspace site for BIOL 322. You must read this paper **prior** to your lab and bring it to lab as a hard copy or a digital copy on your laptop or other device. Discussion will focus on assigned questions and your group's responses to these questions will be submitted as a single report (no more than 2 pages) compiled by a designated secretary. The secretary's job will rotate among group members. **Due dates for each Discussion Group Report are given in the Lecture & Lab Schedule on the last page of this Syllabus.**

Lab Notebook

Most of the laboratory sessions for BIOL 322 will provide you with the opportunity to observe morphological features and behaviour of marine invertebrates. You will be expected to record notes on these observations in a lab notebook. These notes should take the form of written descriptions and sketches on animal morphology and behaviour. Don't worry if your entries are not recorded in some sort of logical order; simply record your observations as you work through the lab material in whatever order you do so. You should not be adding entries to your lab notebook outside of lab time; your notes and sketches should be recorded as you examine material while working in the lab. It is strongly recommended that you read the lab notebook before coming to class to ensure you are prepared.

The sketches of animals or animal components that you include in your lab notebook should each include a figure caption, neat labels, and a scale bar

Comparative Anatomical Study
Information about what will be involved with the Comparative Anatomical Study is provided in detail within the lab manual for BIOL 322.

GRADING:

Lecture:	Midterm Exam – **MONDAY FEB 12, 2024** (lectures 1-10 inclusive)	20%
	Final Exam (emphasis on material since Midterm Exam)	30%
	TOTAL LECTURE:	**50%**
Lab:	Discussion Group Reports	10%
	Anatomical Study Proposal (due at start of lab #3 Jan 31 & Feb 01)	5%
	Anatomical Study Report (due at end of lab session Mar 20 & 21)	18%
	Lab Notebooks (due by 11:59pm the day of your lab)	17%
	TOTAL LAB:	**50%**

- **Late submission of the Comparative Anatomical report will be deducted 10% per day late.**

- **If the midterm lecture exam is missed, the final grade will be calculated by proportional averaging of all other grades.**

- **The University of Victoria has waived the requirement for a note from a medical professional in the event that illness, emotional trauma or mental health issues prevent a student from writing an exam.**

- **Completion of the final lecture exam is a required component of BIOL 322. Failure to write the final lecture exam will result in a grade of "N" regardless of the cumulative percentage on other elements of the course. N is a failing grade and factors into GPA as a value of 0.**

- **Students must receive a passing grade in both the laboratory component and the lecture component of the course in order to receive an overall passing grade - this is a rule of the Biology Department.**

If a student misses the final lecture exam and cannot write it before final grades are submitted for the course, they will need to submit a formal request for concession using a Request for Academic Concession form (https://www.uvic.ca/registrar/assets/docs/record-forms/rac.pdf).
If the concession is granted, arrangements will be made for the student to write a final lecture exam at a later time. A grade of N will be assigned until the final lecture exam is completed and the final grade calculated, at which time the N grade will be changed to the grade achieved for all completed course components.

Marks will be converted to letter grades according to the following table:

A+	90 – 100%	B+	77 - 79%	C+	65 - 69%
A	85 – 89%	B	73 - 76%	C	60 - 64%
A-	80 – 84%	B-	70 - 72%	D	50 - 59%

Grades will be rounded-off to the nearest whole number percentile (xx.5 will be rounded up)

No supplemental exams are offered in the Biology Department

Please note that the final exam period for the Jan-Apr term 2024 extends from Thurs Apr 11 to Fri Apr 26, 2024, inclusive. Do not make travel plans until after the final exam timetable has been posted!

Biology 322 – 2022 Biology of Marine Invertebrates – Lecture and Laboratory Schedule

DATE	LECT. NO.	LECTURE TOPIC	LAB EXERCISES & DISCUSSION GROUPS
Mon Jan 8	1	Introduction to course; begin suspension feeding	---
Thu Jan 11	2	Nutrition – suspension feeding	
Mon Jan15	3	Nutrition – uptake dissolved organic matter & Algal symbionts	---
Thu Jan 18	4	Nutrition – animal-microbial: algae symbioses	#1 Suspension Feeding – I **(Discussion #1)** Choose partner & animals for Comp. Anatomy Project
Mon Jan 22	5	Nutrition – animal- microbial: algae symbioses	---
Thu Jan 25	6	Nutrition – animal-prokaryote symbioses	#2 Suspension Feeding – II **Group report for Discussion #1 due** Final decision on animals for Comp. Anatomy Project
Mon Jan 29	7	Nutrition – animal-prokaryote symbioses – **GUEST LECTURER**: Fabio De Leo, ONC	---
Thu Feb 01	8	Musculoskeletal systems – introduction	#3 Symbioses **(Discussion #2)** **Proposal for Comparative Anatomy Project due**
Mon Feb 05	9	Musculoskeletal systems – Muscle components	---
Thu Feb 08	10	Musculoskeletal systems – levers & ballistic devices	#4 Size and Shape **(Discussion #3)** **Group report for Discussion #2 due**
Mon Feb 12		**MIDTERM LECT. EXAM – lectures 1-10 inclusive**	---
Thu Feb 15	11	Soft Bodies – hydrostatic skeletons	#5 Comparative Anatomy Project – study animal #1
Feb 19-23		**READING BREAK**	**READING BREAK**
Mon Feb 26	12	Soft bodies — **GUEST LECTURER**: Hugh MacIntosh, Royal BC Museum	---
Thu Feb 29	13	Defense – structural defenses	#6 Comparative Anatomy Project – study animal #2 **Group report for Discussion #3 due**
Mon Mar 04	14	Defense – chemical defenses	---
Thu Mar 07	15	Defense – behavioural defenses	#7 Muscle & Skeletal Systems **(Discussion #4)**
Mon Mar 11	16	Defense – induced	---
Thu Mar 14	17	Biomineralization — **GUEST LECTURER**: Hugh MacIntosh, Royal BC Museum	#8 Biomineralization **Group report for Discussion #4 due**
Mon Mar 18		**No Lecture** – Finish up Comp. Anatomy Project	---
Thu Mar 21	18	Transparency & Bioluminescence	**Comp. Anatomy Project reports due at end of scheduled lab period** No lab exercise scheduled for this week
Mon Mar 25	19	Reproduction	---
Thu Mar 28	20	**Reproduction**	#9 Reproduction & Development
Mon Apr 01		**Optional Review Session**	---