

BIOE 122 & 122L: Invertebrate Zoology

Class #: 70509 & 70510

Summer Session 1, June 24 – July 26, 2024

The vast majority (~97%) of described animal species on Earth are invertebrates. These animals represent a truly remarkable level of diversity, ranging in size from the microscopic to the 60-foot giant squid or 150-foot colonial siphonophore. How do these animals' different body plans help them contend with the universal challenges of being alive?

Through this course, you will learn to recognize the major invertebrate phyla. You will make detailed observations about and document organism form, and you will contextualize organism form and function in ecological and evolutionary terms. You will also work collaboratively with your classmates and read and interpret the primary scientific literature.

You will accomplish these goals through a combination of in-person lectures, class discussions, readings, homework assignments, videos, laboratory observations and dissections, and field observations. This course is 100% in person. Students should be registered for both BIOE 122 and BIOE 122L.

Course Meeting Times and Location

Lecture: M/W 9:00 am – 12:00 pm

Lab: M/W 1:00 – 4:30 pm

Location: Seymore Marine Discovery Center teaching classroom, 100 McAllister Way, Santa Cruz, CA 95060. The door to the classroom is behind the blue whale skeleton
On July 22 and 24, class will take place in CBB, Rm 115.

Instructor Information and Communication

Dr. Rachel Crane (she/her) – racrane@ucsc.edu

- Feel free to call me Rachel (Dr. Crane or Prof. Crane are ok too)
- Office hours by appointment

Teach Assistant: Ben Walker (he/him) – benwalker@ucsc.edu

- Office on Campus: CBB 238
- Office hours: Monday/Wednesday 4:30 – 5:00 pm

Both instructors can be reached by email or over Canvas. We will strive to respond to messages within one working day. Please note though that we may not see messages or respond outside of normal working hours (M-F, 9 am – 5 pm).

BIOE 122 & 122L Learning Pact

What you can expect from me

- I will maintain an organized course that will help you reach your learning outcomes.
- I will be actively present in your learning.
- I will reach out to you as I see you need help.
- I will provide a supportive and safe class environment where we are free to share and discuss ideas.
- I will treat you with dignity and respect and be flexible to support your individual needs.

- I will do my best but, like all of us, I am human and occasionally make mistakes. I will learn from those mistakes and will work to correct them.

What I will expect from you

- You will treat me and your peers with dignity and respect.
- You will attend class each session and work collaboratively with your peers.
- You will strive to be an active participant in this course.
- You will reach out to me when you need help so we can work together on a plan to best meet your needs as you continue to reach the objectives of the course.
- You will be kind to yourself. Expect that mistakes will be made but pledge to learn and grow from those mistakes.

Learning Outcomes

1. Know, identify, and distinguish major invertebrate phyla, classes, and orders.
2. Describe how features of invertebrate morphology are adapted to specific functions and ecosystems.
3. Make detailed observations about and document invertebrate morphology and behavior in the lab and the field.
4. Read, interpret, and discuss primary scientific literature.
5. Work collaboratively with peers to deepen scientific observations and discuss scientific concepts.

Prerequisites

Prerequisites: BIOL 20A, BIOE 20B, and BIOE 20C and satisfaction of the Entry Level Writing and Composition requirement.

Required Materials and Textbooks

Students will be required to keep and submit a laboratory notebook. Students must have an unlined, at least 8x10" bound notebook. A pencil, eraser, and colored pencils will all be helpful for drawing invertebrates during lecture and lab.

Textbooks and resources on Canvas may be helpful during both lecture and lab sections, so students may want to bring their textbook and a laptop or tablet with them to class.

One textbook on invertebrate biology is required for this course, but students may pick from the following options the text that best matches their own interests and/or the one that is most easily accessible/affordable. The textbook may be in any format, and many of these are old and available for <\$30:

Invertebrate Zoology (Ruppert et al) 7th edition **ISBN-10:** 0030259827

Invertebrates (Brusca et al) 4th edition: **ISBN-10:** 0197554415 (3rd edition would also work: **ISBN-10:** 1605353752)

Biology of the Invertebrates (Pechenik) 7th edition **ISBN-10:** 0073524182 (6th edition would also work **ISBN-10:** 0073028266)

Free alternative: there is an open source etext (An Introduction to Invertebrates - Moore 2006) which can be found in the files tab. This text is not as comprehensive, but it does provide a free alternative.

Assignments & Assessments

Lecture Grade:

- Homework: 50% (or 400 points)
- Lab: 25% (or 200 points)
- Midterm: 10% (or 80 points)
- Final: 15% (or 120 points)

Lab Grade:

- Lab Notebook: 100%, 20 points per lab for 200 points total

Grading Scale:

- A: > 90%: 90-92 A-, 93-96 A, 97-100 A+
- B: 80-89%: 80-82 B-, 83-86 B, 87-89 B+
- C: 70-79%: 70-76 C, 77-79 C+
- D: 60-69%: 60-62 D-, 63-66 D, 67-69 D+
- F: < 60%

Assessment Types

Homework

Graded homework assignments will be turned in on Canvas before the start of class every Monday and Wednesday. These assignments will be primarily essays and short-answer questions and come in 2 types.

The assignments due on Mondays (Synthesis - 50 points each) are designed to increase familiarity with major invertebrate phyla and provide practice synthesizing that knowledge into evolutionary and ecological contexts.

The assignments due on Wednesdays (Paper discussion - 40 points each) ask students to read and write about a specific study from the primary literature relevant to that week's topics. Students will discuss the paper during class and submit a brief group reflection after the discussion (10 points each). Through these assignments, students will practice reading and discussing the primary literature and synthesizing their knowledge of invertebrate taxa.

Lab

Students will keep a lab notebook where they will document organisms and observations as directed during lab section each week. Lab notebooks will be collected every Wednesday, graded, and returned to students during lab Monday. Through these lab activities, students will gain familiarity with invertebrate phyla and practice observing and documenting organisms.

Midterm and Final

Students will have a midterm after the third week of the quarter that will cover content through annelids. During the last week of class, students will take a comprehensive final. Both exams will be taken over Canvas on the students' own time and will evaluate students' ability to identify major invertebrate phyla and to place distinguishing characteristics into evolutionary and ecological contexts.

Late work

Because of the accelerated nature of this 5-week course, it is even more important than usual not to fall behind on assignments. However, I also understand that things happen. You have a two-day “bank” for late assignments: with no penalty or explanation, you can submit one assignment two days late or two assignments one day late. *Note:* Because they are in preparation for class discussion, the Wednesday paper discussion assignments cannot be turned in late (the reflections on the discussions can). Work turned in late may result in delayed grading.

If you are absent, you are still required to submit the assignment at the scheduled time.

Attendance & Participation

This course is only 5 weeks and is 100% in person. Participation looks different for different students, and I hope you will actively engage in the class in the ways that work best for your learning. Because we will be moving so quickly, attending both lecture and lab every day is important to your success. Of course, unexpected things come up, and with this in mind, you can miss lab and lecture on two days. After this, you will lose one letter grade per day absence. As participation in lab is necessary to earn the points associated with that lab, I can offer a make-up activity for one missed lab day.

If you are absent, you are still required to submit the assignment at the regularly scheduled time.

Electronics Policy

For the duration of lecture and lab, I ask that you be present in the classroom. This means that laptops and tablets are welcome and encouraged, as long as they are being used for educational, class-related purposes. Phone use, however, is not permitted during either lecture or lab. Phones must be turned off and put away. If you must keep a phone on by reason of a personal emergency, you must inform me before class begins.

Accessibility

I am here to support every student and am committed to making this course one where every student can succeed. Any student who is concerned about running into barriers because of a disability should contact the DRC (Disability Resource Center). If you are already working with the DRC, make sure you have requested Academic Access Letters.

DRC Contact: phone at 831-459-2089 or email at drc@ucsc.edu

In addition, you can request to meet privately with me during my office hours or by appointment as soon as possible. I would love to discuss how we can implement your accommodation in this course to ensure your access and full engagement.

Academic Integrity

Collaboration, communication, and building on the work and knowledge of others are key components of science, and I encourage you to talk with and learn from your peers during this course. However, fundamentally, this course is designed to build your own understanding of invertebrate phyla and to synthesize that knowledge in a broader framework. I encourage you to discuss readings, but when completing individual graded assignments, all work must be your own.

All members of the UCSC community benefit from an environment of trust, honesty, fairness, respect, and responsibility. You are expected to present your own work and acknowledge the work of others. Any work violating the academic integrity policy will receive zero credit, and violations may be reported to UCSC, resulting in disciplinary action according to UCSC Academic Integrity Policy.

For the full policy and disciplinary procedures on academic dishonesty, refer to the [Academic Misconduct page](#) at the [Division of Undergraduate Education](#).

Generative Artificial Intelligence Statement

Effectively using and deploying generative AI (e.g., ChatGPT) are increasingly important skills in contemporary society, but these skills are not the focus of this course. Instead, this course is focused on developing your personal knowledge of invertebrate phyla and your critical thinking skills in synthesizing this knowledge.

Both the ability to think critically and the ability to clearly convey those thoughts with language are key skills of a biologist, and engaging with you in developing these skills is why I am here.

In this class, I ask that you complete your work without using AI-generated sources to augment, think through, or write your assignments.

If you submit work that appears to have been written using AI sources, I will ask you to meet with me to discuss your thinking and writing process. If, after our conversation, I conclude it's more likely than not that you did not personally complete an assignment you submitted under your name, I may refer you to your college provost for further conversation.

Ask if you are confused!

If you have questions about academic integrity, AI use, and/or proper attribution of other people's work, please come ask me! Scholarly citing is not particularly intuitive, and part of my role is to help you learn those conventions.

Title IX and CARE

UC Santa Cruz is committed to providing a safe learning environment that is free of all forms of gender discrimination and sexual harassment, which are explicitly prohibited under Title IX. If you have experienced any form of sexual harassment, sexual assault, domestic violence, dating violence, or stalking, know that you are not alone. The Title IX Office, the Campus Advocacy, Resources & Education (CARE) office, and Counseling & Psychological Services (CAPS) are all resources that you can rely on for support.

Please be aware that if you tell either the instructor or TA about a situation involving Title IX misconduct, we are required to share this information with the Title IX Coordinator.

Confidential resources are available through [CARE](#). Confidentiality means CARE advocates will not share any information with Title IX, the police, parents, or anyone else without explicit permission. CARE advocates are trained to support you in understanding your rights and options, accessing health and counseling services, providing academic and housing accommodations, helping with legal protective orders, and more. You can contact CARE at (831) 502-2273 or care@ucsc.edu.

You can make a Title IX report through the [online reporting link](#) or by calling 831-459-2462.

Additional Resources

Additional resources available at UCSC to support you in a variety of ways including your academic success to your mental wellbeing to IT issues are detailed in Module 0 on the course Canvas page.

Tentative Course Schedule

Week-Day	Topic	Lab Activity	Deliverables
1-Mon	Intro Porifera	Scientific Drawing Porifera	None
1-Wed	Cnidarians Ctenophores	Cnidaria	Paper discussion 1 Notebook check 1
2-Mon	Nemertean Platyhelminthes Mollusks 1	Bivalves and gastropods	Synthesis 1
2-Wed	Mollusks 2 Cephalopods Guest lecture: Dr. Ben Burford	Squid activity with Ben Burford	Paper discussion 2 Notebook check 2
3-Mon	Annelids	Annelids	Synthesis 2
3-Wed	Arthropods 1 Insects with Christofer Brothers	Insect outdoor exploration with Christofer Brothers	Paper discussion 3 Notebook check 3
Midterm at home. Covers material through annelids.			
4-Mon	Arthropods 2 Lophophorates	Crustaceans and bryozoans	Synthesis 3
4-Wed	Echinoderms	Echinoderms	Paper discussion 4 Notebook check 4
5-Mon*	Hemichordates Chordates	Intertidal field trip ** EARLY MEETING	Synthesis 4
5-Wed*	Misc. groups Wrap-up	Wrap-up	Notebook check 5
Final cumulative exam at home.			

* class in CBB 115

Important Deadlines

Add/Swap: Thursday, June 27th

Drop: Monday, July 1st (tuition reversed)

Request "W" grade: Sunday, July 14th (no tuition reversal)

Change Grade Option: Sunday, July 21st