

# Welcome to Comparative Animal Physiology

Summer 2023 | Coastal Biology Building 110 | Mehta, Hinojosa

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## Course Description (In-person; Attendance is Mandatory)

This course will explore organ systems and their physiological functions at the molecular and whole organism levels. We will go over traits that define animals. We will cover the diversity of animal systems. We will discuss the basic mechanics underlying how animals move and feed. We will learn how some animals tweaked their basic machinery to achieve high performance behaviors. In learning the basics of animal physiology, we will ask, “How does Usain Bolt sprint so fast? How do boas and pythons consume prey nearly as large as their own bodies? How are mantis shrimp some of the fastest animals on earth? How do aquatic mammals and turtles hold their breath for long periods of time? These are just examples of some of the fun and fascinating physiological questions that we will tackle this Summer.

## Prerequisites

**Bioe 20A (Cell & Molecular Biology)**

**Bioe 20B (Development & Physiology)**

**Bioe 20C (Ecology & Evolution)**

Professor Mehta ([rmehta2@ucsc.edu](mailto:rmehta2@ucsc.edu))

**OHs:** Thursday 4-5 pm or as soon as lab ends, which may be earlier or right after lecture.

Natasha Hinojosa ([nahinojo@ucsc.edu](mailto:nahinojo@ucsc.edu))

**OHs:** Tuesday 4-5 pm or as soon as lab ends, which may be earlier

## Course readings

Under **Files**, in the *course readings* folder in CANVAS – we will be reading chapters from [Animal Physiology 4<sup>th</sup> edition by Richard Hill, Gordon Wyse and Margaret Anderson, Sinauer Associates.](#)

We are providing the chapters to you for free because the textbook is expensive and we only cover, albeit in detail, less than a quarter of the chapters in the textbook. For those of you who would prefer a textbook, used editions are available on Amazon (\$110.00, PRIME, brand new) while loose leaf ranges from \$54-108, last time I checked. You may also rent the book at a reduced expense (\$49.94). Two copies of the text are on reserve at the Science Library and you may always ask me if you can use one of my copies. I just request that you pick a place to study/read it in CBB because a previous student did walk away with my book ☹️.

**Under Files, in the *optional readings* folder in CANVAS – we will have supplemental readings (all downloaded manuscripts) available to you, but you will not be tested on these reading. These readings are to help those of you who want to read deeper to be more advanced in your physiology knowledge.**

## Course Learning Outcomes

***This course will focus on how animals (all different kinds) work. After completing this course you, as our students, should be able to:***

- 1) Explain the different phyla that comprise the Metazoa and what members are in these phyla.
- 2) Explain how circulation differs between animals and where we see increased complexity in the system
- 3) Explain the fundamentals of aerobic and anaerobic metabolism

- 4) Determine what inherent traits and abiotic factors in the environment influence how animals perform
- 5) Explain digestion in different animals
- 6) Explain how organisms osmoregulate across a variety of environments and how osmoregulation is related to digestion
- 7) Compare and contrast different types of pumps that are central to the circulatory system
- 8) Compare and contrast the different mechanisms that organisms have evolved to exchange respiratory gases in a variety of environments

***In this course we will also focus on practicing several important scientific skills. After completing this course, students should be able to***

- 1) Ask questions and practice inquiry-based thinking in class with peers.
- 2) Read and interpret a wide variety of graphics
- 3) Work collaboratively with a peer to successfully complete the science podcast assignment

### Course Syllabus

Week #	Day: Tues, Thurs	Topics	Readings	Notes
Week 1	August 1	-Introduction & Metazoans -Explain Physiology Project (podcast) -Circulation (Is there more to closed versus open systems?)	Familiarize yourself with the syllabus and organization on CANVAS; <b>Optional reading: Reiber and McGraw 2009</b>	Getting to Know You- 10 points on CANVAS (Due by August 8)
	August 3	-Energy Metabolism	Chapter 7 (Stop at metabolic scaling section)	Quiz 1 on CANVAS <b>Work on Physiology presentations</b>
Week 2	August 8	-Aerobic & Anaerobic Forms of Metabolism -Quiz I: Metazoa Phylogeny/Diversity	Chapter 8 <b>Science Podcast 1</b>	Quiz 2 on CANVAS <b>Podcast Reflection 1</b>
	August 10	-Finish Metabolism -Ultra-Fast Movements -Scaling & Tuco (Metabolic scaling section from Ch 7)	Chapter 8 <b>Optional reading:</b> Kaji et al. 2018 <b>Science Podcast 2</b>	<b>Midterm 1 (at home)</b> <b>Podcast Reflection 2</b>
Week 3	August 15	-Physiology of Digestion	Chapter 6 <b>Science Podcast 3</b>	Food journal <b>Podcast Reflection 3</b>
	August 17	-Physiology of Digestion -Quiz II: Metazoa Phylogeny/Diversity	Chapter 6 <b>Science Podcast 4</b>	Quiz 3 on CANVAS <b>Podcast Reflection 4</b>
Week 4	August 22	-Extreme Digestion/ Osmoregulation/ Kidney Function	Costa et al. 2013 <b>Science Podcast 5</b>	Quiz 4 on CANVAS <b>Podcast Reflection 5</b>
	August 24	-Kidney Function	Costa et al. 2013 <b>Science Podcast 6</b>	<b>Midterm 2 (at home)</b> <b>Podcast Reflection 6</b>
Week 5	August 29	-Heart Physiology -Quiz III: Metazoa Phylogeny/Diversity	Chapter 25 <b>Science Podcast 7</b>	Quiz 5 on CANVAS <b>Podcast Reflection 7</b>
	August 31	-Diving Physiology	Chapter 26 <b>Science Podcast 8</b>	<b>Midterm 3 = "Final" (at home; non-cumulative)</b> <b>Podcast Reflection 8</b>
		<b>Grades are due to registrar by September 7th. Please be considerate when turning in late assignments.</b>		

**EATING & DRINKING IN CLASS:** I would appreciate it if students and the Teaching Team refrained from eating in class. Drinking water is fine but please try and keep track of your water bottles so lost and found (if your belongings wind up there) does not continue to grow.

**CLASS LOGISTICS/EMAILS:**

**Please refer to Canvas for all class instructions and assignments.** You are responsible for attending class and for everything that is said in class, *including any changes made to the syllabus*. **You should check your UCSC email DAILY to ensure you are getting important course announcements.** If you have a question about course logistics, check the website, ask a friend, and THEN ask the Teaching Team. When you send an email to the Teaching Team (Mehta and Hinojosa), please send the email to everyone on the teaching team (Professor Mehta and Natasha Hinojosa). There are not that many of you which is one of the amazing things about summer session- don't be shy, please talk to us. Also, please understand that we will respond to you as soon as we can. We may respond slower when emailed after business hours (8-5 pm) or over the weekend.

**IN-CLASS CELL PHONE POLICY:**

Please refrain from using cell phones in class. It is distracting to other students and to the instructor.

**SECTIONS:**

There are no sections for BIOE 131/L.

**ASSIGNMENTS:**

Unless otherwise specified, CANVAS quizzes are due **ONLINE** as indicated by the syllabus. After a due date passes, assignments will remain open for a few days (just communicate with us). **Assignments not turned in during this grace period will be docked 10% for each day that it is late. Items turned in 1 week or later after the due date will receive no credit. IMPORTANT: Note that due dates may change depending on the pace of the class.** You are responsible for reading emails and in-class announcements to know when this happens.

**ACTIVE LEARNING:**

This class values your participation. In class we will facilitate your learning by incorporating opportunities for you to actively engage with the material as much as we can. *Scientific data shows that people learn more effectively when they take an active role in their learning even in class!*

**WHAT TO DO ON YOUR OWN:** *Passive learning strategies:* Read course readings or lecture notes, watch lecture capture video recordings when they are available, make flash cards, make a vocabulary list for each lecture, rewrite your notes in different color inks and ask questions in class or during office hours.

*Active learning strategies include:* drawing and labeling diagrams, standing at a whiteboard and walking someone else through a concept or just talking through concepts with people.

**OFFICE HOURS:** Students are **enthusiastically** encouraged to attend office hours. You are welcome to come with specific questions or to just "talk biology". *We appreciate not being put in a situation where we need to respond to requests for notes or "what is going to be on the exam. If you miss class, please talk with your classmates."* The expectation is that you attend class. Professor Mehta's OHs often wind up being general group question and answer periods. If you have a private question/issue to discuss, please contact Professor Mehta ahead of time which will allow Professor Mehta to secure some time with you within or outside office hours to have a discussion.

**EXAM POLICIES & ACADEMIC INTEGRITY:**

No exams will be given prior to the specified dates. **No makeup exams will be given**, except in case of serious accident, illness, or death in the family. In such cases **verification will be required**, and instructor must be notified within 24 hours of the exam.

We embrace communal learning but taking from another student, copying another student's work or completing work for another student is never allowed and all fall into the category of cheating. Please don't cheat. It embarrasses everyone including your Teaching Team who want to help you learn. All cases of cheating will be discussed with the student and then reported to the university for possible additional disciplinary action, according to the university's Policy on Academic Integrity, [http://www.ucsc.edu/academics/academic\\_integrity/undergraduate\\_students/](http://www.ucsc.edu/academics/academic_integrity/undergraduate_students/).

### **GRADES:**

Grades will be calculated as follows:

Getting to Know You Assessment + 5 Quizzes (10 pts each = 60 pts)	17%
Midterm I (50 pts)	14.4%
Midterm II (50 pts)	14.4%
Midterm III (50 pts, during finals but is just a midterm, non-cumulative)	14.4%
Metazoan Quiz I, II (20 pts each = 40 pts, 3 tries, best 2 of 3)	11.4%
Physiology Podcast (30 pts, Rubric under Files)	8.5%
Science Podcast Reflections (8, 5 pts each = 40)	11.4%
In-class Participation (30 points)	8.5%
<b>Total Points: 350</b>	

**Extra Credit:** There is no extra credit assigned for this course.

**Quizzes:** All CANVAS quizzes will be re-graded by your Teaching Team once everyone has completed the quiz at the end of the week/ beginning of the following week. We will not respond to emails requesting that we review or regrade the quiz because regrading is built into our duties. If you still have questions about your CANVAS quiz score a week or more outside of the due date, please reach out to the entire Teaching Team or come to a member of the Teaching Team's office hours.

**TIME:** This 5-unit course is composed of 7 weekly lectures (3.5 hrs twice a week). You are expected to read and work on your learning and assignments for 12-18 hours per week.

**COURSE ORGANIZATION & EXPECTATIONS:** Your Teaching Team will foster a fun learning community. Our expectations of you as students in this upper division course is that you come to class prepared, engaged, and curious. We will also do some peer-peer sharing in this course. We expect students to fully participate in their peer-peer sharing, treat peers with respect, contribute intellectually to assignments and ask for help if needed.

**TRANSFER STUDENTS & Student Visitors:** Welcome to UCSC! We recognize that transfer students have a unique experience and in addition to the regular course work may have other challenges associated with starting off at UCSC as a new student. Please don't hesitate to reach out to any member of your Teaching Team for guidance. We all want you to be successful and look forward to your unique contributions to our learning community. If you are here as a visiting student for the summer- Welcome. Please don't hesitate to ask us questions about EEB and UCSC. We ❤️ it here and you will too.

**DRC STUDENTS:** Welcome! UCSC has started a new program where students can request DRC accommodations as early as 2 weeks before the end of Winter quarter for Spring. The new program is through a platform called Accommodate. Once you request your DRC letter, it gets emailed to Professor Mehta through the Accommodate platform. Professor Mehta reads the letter and signs the letter revealing that the DRC request for accommodations was acknowledged. Testing will be coordinated through PBSCI testing and will take place at the CBB building. **Please let DRC know if you have questions.** To request and assessment for DRC accommodations or to inquire about accommodations, please contact the following DRC divisions: General DRC Email: [drc@ucsc.edu](mailto:drc@ucsc.edu); Alternative Media Services Email: [altmedia@ucsc.edu](mailto:altmedia@ucsc.edu); Exam Services Email: [drcexams@ucsc.edu](mailto:drcexams@ucsc.edu); Notetaking Services Email: [drcnotes@ucsc.edu](mailto:drcnotes@ucsc.edu); Accommodation Services Email: [drcclass@ucsc.edu](mailto:drcclass@ucsc.edu); Deaf Services Email: [drc\\_deaf@ucsc.edu](mailto:drc_deaf@ucsc.edu).