



Spring 2025 BISC 469: Marine Biology (4 units)
M and W 2:00-3:30 plus lab section

Location: Class: ZHS 252; Lab: ZHS 469

Prerequisite(s): BISC 103, BISC 220 or BISC 121.

Instructional Team:

Dr. Karla Heidelberg

Office Hours: TBA

Location: CAS 203

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Dr. Jill Sohm

Office Hours: TBA

Location: CAS 100

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TA: Jacob Denova

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Required Text: J. Levinton, 2022, Marine Biology Function, Biodiversity, Ecology (6th ed.)

Previous versions are acceptable, with students being responsible for looking up corresponding chapters. Older edition copies available for short term loans.

Course Description: The marine environment encompasses 98% of the Earth's biosphere and contains an incredible diversity of microbial, algal, and animal life forms. Marine biology is the study of the biology and ecology of organisms found in the ocean. Students in this course will develop an understanding of the biology of marine organisms and the biological and physical processes that affect these organisms, their populations, and their coastal and oceanic ecosystems. Specific topics will include primary and secondary production; physiological ecology and evolution of marine organisms; marine habitats and communities; and impacts of humans on the ocean and conservation. Some class aspects will include discussions of primary literature as well as text chapters.

Learning Objectives

General objectives of the course

Marine Biology lectures, laboratories, and projects will give you experience toward some of the general curricular goals of the University, including:

- 1) The ability to think logically, analytically, and independently;
- 2) The ability to communicate clearly and effectively, both orally and in writing;
- 3) The ability to learn independently and as part of a group; and
- 4) The ability to explain information related to the specific sub-biology discipline of marine biology.

Specific learning objectives: By the end of this course, students will be able to:

- 1) Describe the variety of marine habitats in the world's oceans
- 2) Identify the major phyla that occur in particular marine habitats (e.g., plankton, nekton, intertidal and subtidal, deep ocean, etc.), and describe key aspects of their biology and unique adaptations.
- 3) Explain how abiotic factors (e.g., temperature, salinity, oxygen, nutrients, water flow) structure marine population distributions and drive adaptations.
- 4) Explain how biotic factors (e.g., predator-prey, competition, symbiosis, genetics, and differences in physiology) structure marine populations and influence distribution, abundance patterns and community structure.
- 5) Explain major physiological processes of ocean organisms reflecting on the environmental limitations of the ocean.

- 6) Formulate hypotheses and conduct a research study to investigate particular problems in marine biology or physiology through laboratory exercises. Students will work both individually and in teams to design the research projects, collect data and present the results in oral and written formats.
- 7) Describe how humans impact marine ecosystems and organisms at multiple scales.

Website: Brightspace <https://brightspace.usc.edu>

Postings on Brightspace will be an official source for announcements, course/lab materials, lecture notes, assignments, grade postings and general discussions. Grading rubrics and/or expectations will be provided with each assignment. Students are responsible for checking the course website on a regular basis. Additional supplemental readings or videos will be listed in the syllabus and/or posted on Brightspace. Assigned readings or videos may be used in the development of assessments.

Course environment and attendance: Students are expected to be respectful of others in the class or lab at all times as outlined in the USC Code of Conduct. Students are encouraged (and expected) to engage in class discussions with respect and openness, valuing diverse perspectives and fostering a supportive environment where all voices are heard.

Class Attendance: The classes and labs are designed to be in-person. Attempts may be made to record lectures for posting, but technical difficulties or other logistics may prevent class recordings. Students who miss classes are responsible for finding out about any class announcements or other class members and meeting posted deadlines. It is in your best interest to participate in class discussions and interact positively with other members of the class. Missing multiple lectures and/or not engaging in laboratory activities will result in loss of points in the class “participation” category.

Lab Attendance: Laboratory sessions will involve fieldwork, data generation and analyses, report writing, and presentations. Students are required to attend all labs. No makeup labs will be given. Points will be deducted from lab assignments if you are late to lab or do not effectively clean up your lab bench at the end of lab. If a student misses a lab for a university approved reason, that lab can be prorated or an alternate assignment can be provided, provided there is clear communication with the instructional team in a timely manner. Planned religious or athletic absences must be cleared by the second week of class.

Weekend Field Trip: This class includes a **mandatory weekend field trip to Catalina Island 2/21-2/23**. The USC boat will leave from the Port of Los Angeles on Friday, 2/21, and arrives back to the port at 2:30 on Sunday, 2/23. A bus will be provided for mainland transportation. Students that have a perceived conflict with this field trip must contact Dr. Heidelberg for permission to register.

Date	Lecture topic	Assignments	Instr.
M, 1/13	1. Course Overview and Introduction history of the study of the ocean	HW#1: Student questionnaire HW#2: Ocean Map and Marine Biomes Worksheet (due Jan 22)	
W, 1/15	2. Physical and Chemical Properties in the Ocean		
M, 1/20	MLK Holiday		
W, 1/22	3. The role of nutrients in marine systems/introductions to nutrient cycles		
M, 1/27	4. Plankton I: Prokaryotes/ microbial eukaryotes)		
W, 1/29	5. March of the Phyla - Class at the Los Angeles Natural History Museum	Presentation topic list provided	

M, 2/3	6. Plankton II: Intro to Zooplankton	Watch: https://www.youtube.com/watch?v=xFQ_fO2D7f0	
W, 2/5	7. Plankton III: Gelatinous Zooplankton - the underappreciated group!	Chapter 10, pgs. 199-222	
M, 2/10	8. Deep oceans and hydrothermal vents	Chapter 10, pgs 199-222 Chapter 18, pgs 426-451	
W, 2/12	Exam I	HW #3: Online Research Topic sign up due; Annotated Bibliography assignment explained	
M, 2/17	President's Day		
W, 2/19	9. Larval ecology (reproduction, dispersal and migration)	Overview information for Catalina Island field trip	
M, 2/24	10. No class (make-up for Catalina Island Contact hours)		
W, 2/26	11. Ecological and evolutionary principles of marine biology molecular tools in marine ecology & evolution	HW#4 Who am I? Introduction to GenBank	
M, 3/3	12. Coastal ecosystems I: Intertidal communities - Physical and biological structuring factors (competition, predation, HSPs, larval recruitment, etc.)	Chapter 16: pgs 332-355 and some info from Chapter 15	
W, 3/5	13. Coastal ecosystems: Kelp Forrest Ecology		
M, 3/10	14. Coastal Ecosystems II: Soft sediments and mangrove coastal communities	Chapter 17: pgs 364-368	
W, 3/12	15. Marine Vertebrates - Fish		
3/16-3/23	Spring Break		
M, 3/24	16. Coastal Ecosystems: Estuaries	Chapter 2: pgs 30-31 and Chapter 16: pgs 368-377	
W, 3/26	17. Coastal Ecosystems: Estuaries (cont.)	Chapter 2: pgs 30-31 and Chapter 16: pgs 368-377 HW#5: Student generated test Qs with key	
M, 3/31	18. Exam 2		
W, 4/2	19. Coastal ecosystems III: Coral Reefs – Trouble in Paradise	Chapter 17: pgs 396-424 (biology) Chapter 22: pgs 544-547 (human impacts) HW#6: Coral reef journaling activity	
M, 4/7	20. MPAs and their roles in ecosystem resilience	Chapter 20: pgs 482-484 HW #7: Outline and Annotated Bibliography due	
W, 4/9	21. Marine Vertebrates - Cetaceans	Chapter 9, pgs 182-186	
M, 4/14	22. Marine Vertebrates – Seals and Birds Case studies from extreme polar environments in Antarctica	Chapter 9, pgs 190-195 and Chapter 19	
W, 4/16	23. Human impacts on the ocean: Global Climate Change/ Ocean Acidification	Watch: https://www.youtube.com/watch?v=fgBozLCGUHY	
M, 4/21	24. Invasive Species	Watch: https://www.youtube.com/watch?v=GzrfLPGd9uk	

		HW#8: Invasive Species Assignment	
W, 4/23	25. Human impacts: Marine debris	Outside reading to be posted to BB	
M, 4/28	26. Human impacts: The Blue Revolution- Aquaculture, fisheries and food from the sea		
W, 4/30	27. Final review	Q&A Session and Time for Student evaluations HW#9: Student generated test Qs with key	
M, 5/12	FINAL Monday 5/12, 2:00-4:00		

Date	Labs	
W, 1/15	Week 1 no lab	
W, 1/22	March of the Phyla Diversity Lab; Sponge Lab;	Diversity workbook
W, 1/29	Experimental Design activity; Set up Lemna Growth Lab:	
W, 2/5	Tentative Los Angeles Natural History Museum (independently scheduled Lemna data collection)	
W, 2/12	Lemna Lab datapoint	
W, 2/19	Lemna Lab data, breakdown and data analysis	Data worksheet
Fri-Sun 2/21- 2/23	Catalina Island Field Trip Weekend Intertidal lab; zooplankton sampling activities;	
W, 2/26	Day/Night Zooplankton Comparative Analysis Lab	Engagement and worksheet
W, 3/5	No labs – to account for contact hours on Catalina	
W, 3/12	TBD	
3/16- 3/23	Spring Break	
W, 3/26	Photosynthesis lab: Generation of P. to I. curves	
W, 4/2	California Science Center Field Trip	Lab workbook
W, 4/9	SimBio Keystone Predator Lab (online activity)	
W, 4/16	Student Presentations	
W, 4/23	Student Presentations	
W, 4/30	Student Presentations	

Possible substitute labs:

- Properties of Sea water
- Bivalve feeding lab/measurements of Chlorophyll over time to estimate clearance rates
- Marine Debris
- Coral Lab tour

Grading Breakdown

	Points	% of Grade
Midterm 1	150	
Midterm 2	150	
Midterm 3	150	
SUBTOTAL	525	57%
HW #1: Student questionnaire	3	
HW #2: Ocean Map and Marine Biomes Worksheet	5	
HW #3: On time Presentation topic signup – (using provided list)	5	
HW#4: Who am I – an Introduction to GenBank and sequence data	10	
HW#5: Student generated Qs (+key for grading) for Exam 2	10	
HW#6: Coral Reef Journaling activity	10	
HW#7: Annotated Bibliography + Outline	30	
HW#8: Invasive species assignment	10	
HW#9: Student generated Qs and key for Exam 3 (Final)	10	
SUBTOTAL	100	11%
March of the Phyla Diversity Lab	20	
Experimental Design Lab	20	
Lemna Lab	30	
Los Angeles Natural History Museum	20	
Catalina Island Field Trip Weekend		
Intertidal lab; zooplankton sampling activities; other activities	50	
Day/Night Zooplankton Comparative Analysis Lab	30	
TBD Lab	20	
Photosynthesis lab: Generation of P. to I. curves	20	
California Science Center Field Trip	20	
SimBio Keystone Predator Lab (online activity)	20	
Student Presentations	20	
Student ppt slides	5	
SUBTOTAL	275	30%
Course attendance and participation. Students are expected to attend and engage in group activities including labs, field trips and class discussions.	25	3%
TOTAL	925	

Semester Grading Scale: Course final grades will be determined using the following scale:

Letter grade	Corresponding point range	Letter grade	Corresponding point range
A	94-100	C	72-75
A-	89-93	C-	69-71
B+	86-88	D+	66-68
B	82-85	D	62-65
B-	79-81	D-	59-60
C+	76-78	F	58 and below

USC required syllabus elements:

Assignment Submission Policy: Unless otherwise specified, homework and laboratory assignments will be submitted through Brightspace, which will record the upload time and date. Late assignments will receive a deduction of 10% per day. All grades will be provided on Brightspace. Graded exams during the semester will be returned for student review. The final will not be returned, but students are welcome to make an appointment to review the exam scoring.

Academic Integrity

The University of Southern California is foremost a learning community committed to fostering successful scholars and researchers dedicated to the pursuit of knowledge and the transmission of ideas. Academic misconduct is in contrast to the university's mission to educate students through a broad array of first-rank academic, professional, and extracurricular programs and includes any act of dishonesty in the submission of academic work (either in draft or final form).

This course will follow the expectations for academic integrity as stated in the [USC Student Handbook](#). All students are expected to submit assignments that are original work and prepared specifically for the course/section in this academic term. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s). Students suspected of engaging in academic misconduct will be reported to the Office of Academic Integrity.

Other violations of academic misconduct include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), knowingly assisting others in acts of academic dishonesty, improper citation and/or attribution, and any act that gains or is intended to gain an unfair academic advantage.

Academic dishonesty has a far-reaching impact and is considered a serious offense against the university. Confirmed violations will result in a grade penalty, such as a failing grade on the assignment or in the course, and disciplinary action from the university itself, such as suspension or even expulsion.

For more information about academic integrity see the [student handbook](#) or the [Office of Academic Integrity's website](#), and university policies on [Research and Scholarship Misconduct](#). Please ask your instructor if you are unsure what constitutes unauthorized assistance on an exam or assignment or what information.

Use of AI Generators in this course

Learning material by any means is fine. We expect that you will use AI (e.g., ChatGPT and image generation tools) in this class. Learning to use AI is an emerging skill. Keep in mind the following:

- AI tools are permitted to help you brainstorm topics or revise work you have already written.
- If you provide minimum-effort prompts, you will get low-quality results. You will need to refine your prompts to get good outcomes. This will take work.
- Proceed with caution when using AI tools and do not assume the information provided is accurate or trustworthy. If it gives you a number or fact, assume it is incorrect unless you either know the correct answer or can verify its accuracy with another source. You will be responsible for any errors or omissions provided by the tool. It works best for topics you understand.
- AI is a tool, but one that you must cite if used. Failure to do so is a violation of academic integrity policies. Be thoughtful about when AI is useful. Consider its appropriateness for each assignment or circumstance. The use of AI tools requires attribution. You are expected to clearly attribute any material generated by the tool used.

Course Content Distribution and Synchronous Session Recordings Policies:

Students must obtain explicit permission from the instructor to record classes or labs using personal equipment. USC has policies that prohibit recording and distribution of any course content outside of the learning environment. Recording a university class without the express permission of the instructor and announcement to the class, or unless conducted pursuant to an Office of Student Accessibility Services (OSAS) accommodation. Recording can inhibit free discussion in the future, and thus infringe on the academic freedom of other students as well as the instructor. ([Living our Unifying Values: The USC Student Handbook](#), page 13).

Distribution or use of notes, recordings, exams, or other intellectual property, based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study. This includes but is not limited to providing materials for distribution by services publishing course materials. This restriction on unauthorized use also applies to all information, which had been distributed to students or in any way had been displayed for use in relation to the class, whether obtained in class, via email, on the internet, or via any other media. Distributing course material without the instructor's permission will be presumed to be an intentional act to facilitate or enable academic dishonesty and is strictly prohibited. ([Living our Unifying Values: The USC Student Handbook](#), page 13).

Course Evaluations

This class will use course evaluations.

Statement on University Academic and Support Systems

Students and Disability Accommodations: USC welcomes students with disabilities into all of the University's educational programs. [The Office of Student Accessibility Services](#) (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Student Financial Aid and Satisfactory Academic Progress: To be eligible for certain kinds of financial aid, students are required to maintain Satisfactory Academic Progress (SAP) toward their degree objectives. Visit the [Financial Aid Office webpage](#) for [undergraduate](#)- and [graduate-level](#) SAP eligibility requirements and the appeals process.

Technological Proficiency and Hardware/Software Required: Students are encouraged to have and use a laptop computer. Laptops are available for loan through the university: [USC Computing Center Laptop Loaner Program](#). Course textbooks are also available for loan through the instructors. Other helpful USC Technology Support Links include: [Zoom information for students](#), [Brightspace help for students](#), [Software available to USC Campus](#).

Support Systems:

[Counseling and Mental Health](#) - (213) 740-9355 – 24/7 on call: Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

[988 Suicide and Crisis Lifeline](#) - 988 for both calls and text messages – 24/7 on call: The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States. The Lifeline consists of a national network of over 200 local crisis centers, combining custom local care and resources with national standards and best practices. The new, shorter phone number makes it easier for people to remember and access mental health crisis services (though the previous 1 (800) 273-8255 number will continue to function indefinitely) and represents a continued commitment to those in crisis.

[Relationship and Sexual Violence Prevention Services \(RSVP\)](#) - (213) 740-9355(WELL) – 24/7 on call; Free and confidential therapy services, workshops, and training for situations related to gender- and power-based harm (including sexual assault, intimate partner violence, and stalking).

[Office for Equity, Equal Opportunity, and Title IX \(EEO-TIX\)](#) - (213) 740-5086: Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

[Reporting Incidents of Bias or Harassment](#) - (213) 740-2500: Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

[The Office of Student Accessibility Services \(OSAS\)](#) - (213) 740-0776: OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

[USC Campus Support and Intervention](#) - (213) 740-0411: Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

[Diversity, Equity and Inclusion](#) - (213) 740-2101: Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

[USC Emergency](#) - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call: Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

[USC Department of Public Safety](#) - UPC: (213) 740-6000, HSC: (323) 442-1200 – 24/7 on call : Non-emergency assistance or information.

[Office of the Ombuds](#) - (213) 821-9556 (UPC) / (323-442-0382 (HSC): A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

[Occupational Therapy Faculty Practice](#) - (323) 442-2850 or otfp@med.usc.edu: Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.