

**Instructors:**

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Textbooks: Lecture: J. Levinton, 2018, Marine Biology Function, Biodiversity, Ecology (5<sup>th</sup> ed.)  
or J. Levinton, 2014, Marine Biology Function, Biodiversity, Ecology (4<sup>th</sup> ed.)  
Laboratory: Materials provided by instructional team.

Website: <https://blackboard.usc.edu> (course materials, lecture notes, quizzes, additional readings, grades etc.)

Lecture times: M/W 2:00 - 3:20pm (two lectures per week) GFS 223  
Laboratory times W 3:30 - 6:20pm ZHS 469 (13354R), or  
(one lab per week): W 11:00 - 1:50pm ZHS 469 (13355R)

**Course Overview**

The marine environment encompasses 98% of the Earth's biosphere and contains an incredible diversity of microbial, algal, and animal life forms. This course will examine these organisms in the context of the abiotic (e.g., salinity, nutrients, water currents and tides) and biotic factors (e.g., competition, predation, symbiosis) that influence their distribution and abundance. Specific topics will include primary and secondary production; physiological ecology and evolution of marine organisms; coastal ecosystems, including rocky intertidal biodiversity, estuaries, subtidal communities and coral reefs; pelagic and deep-sea communities; and impacts of humans on the ocean and conservation. Some class aspects will include discussions of primary literature as well as text chapters. Laboratory sessions will involve fieldwork, laboratory analyses, report writing, and special topics presentations.

Prerequisites: BISC 120 or 120; (students with BISC 103 can request an enrollment waiver). Recommended BISC 315. For students planning to take both BISC 473 and BISC 469, the recommended series is BISC 473 followed by BISC 469.

**General objectives of the course**

The lectures, laboratories, and projects will give you experience toward some of the general curricular goals of the university as related to Marine Biology:

- 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 in-depth information related to the specific sub-discipline of marine biology.

**Specific learning objectives related to Marine Biology. By the end of this course,** students will be able to:

- 1) 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 natural history, including their unique marine life adaptations.
- 2) Explain how abiotic factors (e.g., temperature, salinity, DO, nutrients, water flow) structure marine populations. Students will be able to describe how marine organisms adapt to physical conditions and explain how the distribution and abundance of marine organisms is influenced by changes in these physical parameters.

- 3) Explain how biotic factors (e.g., predator-prey, competition, symbiosis, genetic makeup, and differences in physiology) structure marine populations. Students will be able to describe how marine organisms adapt to biotic factors and ecological relationships, and explain their influence on distribution, abundance patterns and community structure.
- 4) Explain major life processes such as photosynthesis and cellular respiration and where they occur in the cells of marine organisms reflecting on the environmental limitations of the ocean.
- 5) Formulate hypotheses and conduct a research study to investigate particular problems in marine biology through laboratory exercises in marine ecology and physiology. Students will work both individually and as part of small groups to design the research projects, collect data and present the results in both oral and written formats.
- 6) Describe how humans impact marine ecosystems and organisms at multiple scales.

**Schedule of lecture and laboratory topics.** *Note: schedule is subject change based on organism availability or other logistical factors. Any schedule changes will be discussed in class and posted on Blackboard.*

Day	Activity	Readings and Assignments
M Jan 13	Lec 1 Introduction to the teaching team and to the marine environment	5 <sup>th</sup> Ed: CH 1, 2 4 <sup>th</sup> Ed: CH 1, 2 <b>HW#1:</b> Student questionnaire (due W Jan 16 via TurnItIn)
W Jan 15	Lec 2 Physical/chemical properties of the marine environment  <b>No lab in week 1</b>	5 <sup>th</sup> Ed: CH 2, 5 4 <sup>th</sup> Ed: CH 2, 4 <b>HW #2</b> Ocean Environment (due W Jan 22 via TurnItIn)
M Jan 20	<b>Martin Luther King Holiday – NO CLASS</b>	
W Jan 22	Lec 3 Ecological and evolutionary principles of marine biology  <b>Lab 1: Los Angeles Natural History Museum Marine Invertebrate Diversity Lab</b>	5 <sup>th</sup> Ed: CH 4 4 <sup>th</sup> Ed: CH 3 <b>HW#3:</b> complete R installation guide (checked in lab W Jan 22) <b>Lab #1: Diversity Workbook</b> (due at end of lab)
M Jan 27	Lec 4 Marine ecophysiology	5 <sup>th</sup> Ed: CH 5 4 <sup>th</sup> Ed: CH 4 <b>HW #4</b> Literature Search Assigned (due Mon Feb 26 <sup>th</sup> )
W Jan 29	Lec 5 Reproduction, dispersal and migration  <b>Lab 2 Respirometry Lab</b>	5 <sup>th</sup> Ed: Ch 7 4 <sup>th</sup> Ed: CH 6 <b>Lab #2 Respirometry Lab Report Assigned</b> (due Feb 14 to TurnItIn)
M Feb 3	Lec 6 Molecular tools in marine ecology & evolution	Bonus Chapter (Blackboard) Research Topic Signup
W Feb 5	Lec 7 Benthic life I (Plants, Invertebrates)  <b>Lab 3: Bivalve Feeding and Dissection Lab Overview of how to write a scientific paper</b>	5 <sup>th</sup> Ed: CH 13, 14 4 <sup>th</sup> Ed: CH 11, 12 <b>Lab #3 Lab Bivalve worksheet (due Feb 9th).</b>
M Feb 10	Lec 8 Benthic life II (Inverts, physiology)	5 <sup>th</sup> Ed: CH 6, 14, 15 4 <sup>th</sup> Ed: CH 5, 12, 13
W Feb 12	<b>MIDTERM 1 (Lectures 1-8)</b> <b>Lab 4: Experimental Design</b>	<b>Lab #4 (Post-lab worksheet due Feb 19)</b>
M Feb 17	<b>Presidents Day – NO CLASS</b>	

W Feb 19	Lec 9 Plankton I (prokaryotes/microbial eukaryotes) Watch: <a href="http://nationalgeographic.org/media/plankton-revealed/">http://nationalgeographic.org/media/plankton-revealed/</a>	CH 7 <b>No lab: Lab activities moved to weekend</b>
Feb 21-23	<b>Lab 5: Catalina Island Weekend Field Trip</b> (Shark Harbor mole crab lab; tide pool surveys; bioluminescence demo; kayak or snorkeling; Chasing Coral Movie/Discussion)	<b>Lab #5: Catalina Island workbook</b> assigned (Due Feb 28 <sup>th</sup> )
M Feb 24	Lec 10 Plankton II (zooplankton and gelatinous zooplankton)  <b>LAB PRACTICAL I</b>	CH 7  <b>HW#5 Microbial diversity worksheet</b> Experimental Design (due Wed Feb 28)
W Feb 26	Lec 11 Food web patterns & processes Differential productivity in the world's oceans  <b>Lab 6 Pop Gen Lab</b>	5 <sup>th</sup> Ed: CH 11, 12 4 <sup>th</sup> Ed: CH 9, 10  <b>Lab #6 Pop Gen Lab Report</b> Assigned (due to TurnItIn March 13)
M Mar 2	Lec 12 Marine vertebrates, part 1	CH 8 <b>Literature search due to TurnItIn</b>
W Mar 4	NO CLASS Individual student meetings to discuss presentation outlines (to be individually scheduled between now and March 25) <b>Lab 7: Day/Night Zooplankton Diversity Lab</b>	<b>HW#6</b> Presentation outline and meeting with instructor <b>Lab #7: Zooplankton group data analysis</b> (due Mar 24 <sup>th</sup> )
M Mar 9	Lec 13 Marine vertebrates, part 2	CH 14.
W Mar 11	Lec 14 Coastal Ecosystems I (intertidal)  <b>Lab 8: In class Zooplankton data workup and presentations</b>	
Mar 15-22	<b>SPRING BREAK</b>	
M Mar 23	Lec 15 Coastal Ecosystems II (subtidal 1)	5 <sup>th</sup> Ed: CH 17, 18 4 <sup>th</sup> Ed: CH 15; 16
W Mar 25	Lec 16 Coastal Ecosystems III (subtidal 2)	5 <sup>th</sup> Ed: CH 17 4 <sup>th</sup> Ed: CH 15 Knowlton and Jackson 2008 Normile 2016 (both on Blackboard)
M Mar 30	Lec 17 Deep sea biology and bioluminescence	5 <sup>th</sup> Ed: CH 18 4 <sup>th</sup> Ed: CH 16 Widder 2010 (on BB)
W Apr 1	<b>MIDTERM 2 (Lectures 9-17)</b>	
M Apr 6	Lec 18 Biology in Polar environments Preclass assignment: Under the Antarctica Ice Movie	5 <sup>th</sup> Ed: CH 19 4 <sup>th</sup> Ed: CH 16
W Apr 8	Lec 19 Human impacts: Global Climate Change  <b>LAB PRACTICAL II</b> <b>Discussion: How to give an effective science presentation</b>	5 <sup>th</sup> Ed: CH 3 4 <sup>th</sup> Ed: CH 19
M Apr 13	Lec 20 Introduction to Fisheries Biology	CH 17

	Human impacts: Fisheries and food from the sea Case study of Native Hawaiian lessons in fisheries management	Reading: Pauly 1995 and Wilcox 2012 (posted on Blackboard)
W Apr 15	Lec 21 Biodiversity, Conservation and MPAs  <b>Lab 9: Special Topics Presentations I</b>	Peer participation in presentations <b>HW#7a Powerpoint presentation</b>
M Apr 20	Lec 22 Human impacts: Pollution part 1 nutrients	
W Apr 22	Lec 23 Human impacts: Pollution part 2 – plastics <a href="http://discovermagazine.com/2008/jul/10-the-worlds-largest-dump/?searchterm=ocean%20plastic">http://discovermagazine.com/2008/jul/10-the-worlds-largest-dump/?searchterm=ocean%20plastic</a>  <b>Lab 10: California Science Center Trip</b>	Reading web link to left and TBD  CA Science Center blog entry
	Lec 24 Special topics TBD from class nominations	TBA
	Lec 25 Human impacts: Marine invasive species  <b>Lab 11: Special Topics Presentations II</b>	CH 17  <b>HW#7b Powerpoint presentations</b>
M May 11	<b>FINAL EXAM 2:00-4:00 pm (Lectures 18-25)</b>	

### Lecture Exams:

There will be three lecture exams (200 pts each). Exam questions may include a combination of multiple choice, short answer, T/F, fill in the blank and essays. Material will be drawn from lectures, readings, and laboratory material. Additional readings for specific lectures or labs will be posted on Blackboard during the semester. Some lecture points may be allocated to information from these reading assignments.

**LAB: NO EATING OR DRINKING IS ALLOWED IN THE LABORATORY.**

You are required to attend all lab sessions. Any unexcused absences, late arrivals or early departures will seriously affect your evaluation. Complete all lab activities and clean and return all supplies to their proper place. Check with your instructor before leaving. Laboratory activities will include outdoor activities, bench side experiments and computer-based modeling activities. These activities will emphasize how the ocean works and how marine biologist test their ideas, through quantitative observations, models, and manipulative, controlled, and replicated experiments. A laptop (NOT a tablet) will be required for some lab activities. A free loaner laptop can be obtained from the USC Computing Center. For details, please visit: <https://itservices.usc.edu/spaces/laptoploaner/>.

Some labs will be in the field and **there are two required field trips (see schedule)**. Students are also expected to be on time and have active participation in all field trip activities. Completing labs will require use of a laptop computer. The USC Computing Center Laptop Loaner Program - USC Information Technology Services provides loaner laptops at the general-use computing centers in King Hall, Ahmanson Information Commons at Leavey Library, and Waite Phillips Hall. This service is only available to currently enrolled USC students with a valid USCard. To check out a laptop, go to the service desk at an USC computing center and log into the laptop checkout webpage. <https://itservices.usc.edu/spaces/computingcenters>.

More information: <https://itservices.usc.edu/spaces/laptoploaner>

Pre-Lab quizzes: There may be pre-lab quizzes during the first 5 minutes of each lab session. Students who come late to lab without a legitimate and verifiable excuse will not be allowed to make up the quiz. Questions will cover knowledge of the material you will be covering that day in lab, and/or the results from the previous lab.

Laboratory Practicals: The two lab practical exams will test your understanding of the topics and exercises covered in the laboratory sessions. Laboratory Practicals are Exams that require you to move from desk to desk to identify and answer questions about the displayed specimens or procedures. These exams are timed and regulated; therefore, you must not be late. *Missed Laboratory Practicals cannot be made up.*

Your TA will provide details on lab requirements and expectations for each specific lab.

Lab Reports: Lab reports will be submitted using a TurnItIn link on Blackboard and a hard copy turned in at the beginning of the lab session that it is due, if requested by the TA.

Presentations: Detailed instructions for preparing your presentation, including how points will be assigned, will be provided on Blackboard (<https://blackboard.usc.edu/>).

### **General Course Policies:**

Any document associated with grading may be photocopied by the instructional staff.

Policy on Re-grades: All graded documents will be graded in the context of expectations set by an initial evaluation of all student responses. If you feel that an error was made in the grading of an examination or lab activity, you need to do the following: 1) Prepare a printed statement explaining why you feel your grade was incorrect, and 2) submit this and your original examination to your instructor within one week of the time the examination or assignment was returned to you. Your entire exam or assignment may be re-graded and, as a result, your grade may increase or decrease from a requested re-grade. No frivolous reasons will be accepted for requesting grade changes; stated reasons for a grade change must be legitimate (e.g., error in totaling the score).

Late work: All late assignments must be uploaded to TurnItIn or to your TA personally. All will be date stamped and penalized 5% of a grade per day.

Attendance and participation: Students are strongly encouraged to attend lectures and are required to attend labs. Students who miss classes are responsible for finding out about any class announcements. It is in your best interest to participate in class discussions and laboratory investigations, as well as interact positively with other members of the class. Points can 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.

### Policy on Missed Lecture Exams, Quizzes or Lab activities or Lab Exams:

**UNPLANNED ABSENCES**: You may be excused from an exam or labs only in the event of a documented illness or emergency as outlined by university policy, with notification to the TA or Instructor team within 48 hours. An invalid excuse, or the excuse turned in late, will result in a score of zero for the activity missed. If you miss the final examination and have provided a valid medical excuse within 72 hours of the examination time, a final course grade of incomplete (IN) will be recorded, and you will be permitted to take a make-up final examination during the following semester.

**PLANNED ABSENCES**: Students who wish to miss an examination or Lab Activity for observance of a religious holy day should be aware of the University's policy on such absences, published at: <http://orl.usc.edu/religiouslife/holydays/absences.html>. If the absence is approved as determined by the USC Office of Religious Life, a reasonable accommodation will be provided. If you have any anticipated exam date conflicts due to athletic schedules or religious holidays see an instructor by WEEK 2 of the course.

Website: Postings on Blackboard (<https://blackboard.usc.edu>) will be an official source for announcements, course materials, lecture notes, grade postings and general discussions. Students are responsible for checking the course website on a regular basis. Please notify the TA or Instructor ASAP in the event of any mistakes.

**Grades**: The final letter grade will be assigned on a curve at the end of the semester based on the class distribution and determined by the total number of points described in the below table.

Activity	Points	Section Total	% Final Grade
HW#1_student questionnaire	6		
HW#2_ocean map and marine biomes worksheet	10		
HW#3_R installation guide	15		
HW#4_Literature Search Assignment Topic chosen on time and with good thought	10 5		
HW#5_SimBio Exp .Design	10		
HW#6_Presentation Outline and Faculty Meeting	15		
HW#7_e-copy Scientific PowerPoint Presentation	15		
		86	9.0%
Midterm Exams 1, 2 and 3 (200 points each)	600		
		600	62.8%
<b>Labs</b>			
1_Marine invertebrate diversity prelab	4		
1_Marine invertebrate diversity lab workbook Participation at Natural History Museum	15 5		
2_Respirometry prelab	4		
<b>2_Respirometry lab report</b>	30		
3_Bivalve prelab	4		
3_Bivalve feeding study and dissection lab activity	15		
4_Aplysia prelab	4		
4_Aplysia feeding lab worksheet	15		
<b>Lab Practical I</b>	25		
5_Marine Pop Gen Report	25		
6_Catalina Workbook WMSC weekend participation	25 10		
7_Biodiversity prelab	4		
7_Biodiversity Lab	5		
8_Biodiversity lab in-class data workup – bring Computer (need to download MEGA)	15		
<b>Lab Practical II</b>	25		
9_Special Topics student presentations Student presentation participation in other’s talks	25		
10_California Science Center Worksheet	15		
		270	28.2%

TOTAL		956	100%
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\*(6 EC for completion of course evaluations (these points are not included in the above breakdown))

## Statement on Academic Conduct and Support Systems

### Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Part B, Section 11, “Behavior Violating University Standards” [policy.usc.edu/scampus-part-b](http://policy.usc.edu/scampus-part-b). Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

### Support Systems:

*Student Counseling Services (SCS)* – (213) 740-7711 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. [engemannshc.usc.edu/counseling](http://engemannshc.usc.edu/counseling)

*National Suicide Prevention Lifeline* – 1 (800) 273-8255

Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. [www.suicidepreventionlifeline.org](http://www.suicidepreventionlifeline.org)

*Relationship and Sexual Violence Prevention Services (RSVP)* – (213) 740-4900 – 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender-based harm. [engemannshc.usc.edu/rsvp](http://engemannshc.usc.edu/rsvp)

*Sexual Assault Resource Center*

For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: [sarc.usc.edu](http://sarc.usc.edu)

*Office of Equity and Diversity (OED)/Title IX Compliance* – (213) 740-5086

Works with faculty, staff, visitors, applicants, and students around issues of protected class. [equity.usc.edu](http://equity.usc.edu)

*Bias Assessment Response and Support*

Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. [studentaffairs.usc.edu/bias-assessment-response-support](http://studentaffairs.usc.edu/bias-assessment-response-support)

*The Office of Disability Services and Programs*

Provides certification for students with disabilities and helps arrange relevant accommodations. [dsp.usc.edu](http://dsp.usc.edu)

*Student Support and Advocacy* – (213) 821-4710

Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. [studentaffairs.usc.edu/ssa](http://studentaffairs.usc.edu/ssa)

*Diversity at USC*

Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. [diversity.usc.edu](http://diversity.usc.edu)

*USC Emergency Information*

Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible. [emergency.usc.edu](http://emergency.usc.edu)

*USC Department of Public Safety – UPC: (213) 740-4321 – HSC: (323) 442-1000 – 24-hour emergency or to report a crime.*

Provides overall safety to USC community. [dps.usc.edu](https://dps.usc.edu)