

**BISC 469: Marine Biology****Units: 4****Fall 2020, MW 2-3:20****Location:** Online via Zoom/Blackboard

Lecture times: M/W 2:00 - 3:20pm (two lectures per week) via Zoom

Laboratory times: W 3:30 - 6:20pm ZHS 469 (13354R), or (one lab per week): W 11:00 - 1:50pm ZHS 469 (13355R)

**Instructor:** Dr. Scott Applebaum (*he/him/his*),  
Assistant Professor (Teaching)**Email:** [sappleba@usc.edu](mailto:sappleba@usc.edu), **Zoom Office Hours:** TBA**Teaching Assistant:** Wyatt Million, PhD Candidate**Email:** [wmillion@usc.edu](mailto:wmillion@usc.edu), **Zoom Office Hours:** TBA**Textbooks****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 subjects will include discussions of primary literature as well as textbook chapters. Laboratory sessions will involve laboratory analyses, fieldwork, report writing, and special topics presentations.

**Learning Objectives****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 like photosynthesis and cellular respiration, where they occur in the cells of marine organisms, and how they relate to the limitations the marine environment
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.

**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.

**Course Notes**

This course will use Blackboard for communication, information and turning in assignments. Lecture slides will be made available after the lecture is given. Additional readings will be assigned throughout the semester, and these will be announced on Blackboard as well as in class. Sometimes computers will be used in class to work with data.

## Required Readings and Supplementary Materials

**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

## Communication and Course Technology

- **Blackboard web portal:** Course communications including announcements, course materials, lecture notes, assignments, grade postings, discussions, instructions and submission of completed assignments will be conducted via **Blackboard** (<https://blackboard.usc.edu>). Students are responsible for checking the course website regularly. **Please notify the instructor in the event of any mistakes or difficulties accessing materials.**
- **Zoom teleconferencing:** Synchronous lectures activities (and office hours) will occur via **Zoom**.
- **Email:** If you have questions or need to schedule an appointment (if you are unable to visit during scheduled office hours) please contact the instructor via email. The clearer and more professional your email inquiry, the easier it is for us to address your needs. **Therefore, please read and recheck your message for clarity before sending.** We try our best to respond to emails within 24 hrs. However, if you do not receive a response within that time you may send a follow up inquiry. **Note:** *Please consult the provided course resources before your email (Blackboard, syllabus, assignment instructions, announcements, etc.) as these resources can answer many of your questions. Nevertheless, do not hesitate to contact me if you still need assistance!*
- **USC technology support:**
  - [Zoom information for students](#)
  - [Blackboard help for students](#)
  - [Software available to USC Campus](#)

## DRAFT 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 18	<b>Martin Luther King Holiday – NO CLASS</b>	
W Jan 20	Lec 1 Introduction to the teaching team and to the marine environment	CH 1, 2 (4 <sup>th</sup> Ed: CH 1, 2) <b>HW#1:</b> Student questionnaire
M Jan 25	Lec 2 Physical/chemical properties of the marine environment <b>No lab for week 1</b>	CH 2, 5(4 <sup>th</sup> Ed: CH 2, 4) <b>HW #2</b> Ocean Environment
W Jan 27	Lec 3 Ecological/evolutionary principles of marine biology <b>Lab 1: Invertebrate Diversity Lab</b>	CH 4 (4 <sup>th</sup> Ed: CH 3) <b>HW#3:</b> complete R installation guide <b>Lab #1: Diversity Workbook</b>
M Feb 1	Lec 4 Marine ecophysiology	CH 5 (4 <sup>th</sup> Ed: CH 4) <b>HW #4</b> Literature Search Assigned
W Feb 3	Lec 5 Reproduction, dispersal and migration <b>Lab 2: Respirometry Lab</b>	Ch 7 (4 <sup>th</sup> Ed: CH 6) <b>Lab #2 Respirometry Lab Report</b>
M Feb 8	Lec 6 Molecular tools in marine ecology & evolution	Bonus Chapter (Blackboard) <b>Research Topic Signup</b>
W Feb 10	Lec 7 Benthic life I (plants, Invertebrates) <b>Lab 3: Bivalve Feeding and Dissection Lab</b> <b>Overview of how to write a scientific paper</b>	CH 13, 14 (4 <sup>th</sup> Ed: CH 11, 12) <b>Lab #3 Bivalve worksheet</b>
M Feb 15	<b>Presidents Day – NO CLASS</b>	
W Feb 17	Lec 8 Benthic life II (inverts, physiology) <b>Lab 4: Experimental Design</b>	CH 6, 14, 15 (4 <sup>th</sup> Ed: CH 5, 12, 13) <b>Lab #4 Post-lab worksheet</b>
M Feb 22	<b>MIDTERM 1 (Lectures 1-8)</b>	

W Feb 24	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>Mole crab lab</b>
M Mar 1	Lec 10 Plankton II (zooplankton and gelatinous zooplankton)	CH 7 <b>HW#5</b> Exper. Design
W Mar 3	Lec 11 Food web patterns & processes Differential productivity in the world's oceans <b>LAB PRACTICAL I</b>	CH 11, 12 (4 <sup>th</sup> Ed: CH 9, 10)
M Mar 8	Lec 12 Marine vertebrates, part 1	CH 8
W Mar 10	NO CLASS Individual student meetings to discuss presentation outlines (to be scheduled between now and March 30) <b>Lab 6: Coral photogrammetry</b>	<b>HW#6</b> Presentation outline and meeting with instructor <b>Lab #6 Photogrammetry report</b>
M Mar 15	Lec 13 Marine vertebrates, part 2	CH 14
W Mar 17	Lec 14 Coastal ecosystems I (intertidal) <b>Lab 7: Day/Night Zooplankton Diversity Lab</b>	<b>Lab #7 Zooplankton data analysis</b>
M Mar 22	Lec 15 Coastal ecosystems II (subtidal 1)	CH 17, 18 (4 <sup>th</sup> Ed: CH 15, 16)
W Mar 24	Lec 16 Coastal ecosystems III (subtidal 2) <b>Lab 8: TBA</b>	CH 17 (4 <sup>th</sup> Ed: CH 15) <b>Knowlton and Jackson 2008</b> <b>Normile 2016 (both on Blackboard)</b>
M Mar 29	Lec 17 Deep sea biology and bioluminescence	CH 18 (4 <sup>th</sup> Ed: CH 16) <b>Widder 2010 (on Blackboard)</b>
W Mar 31	<b>MIDTERM 2 (Lectures 9-17)</b> <b>LAB TBA</b>	
M Apr 5	Lec 18 Biology in polar environments Preclass assignment: Under the Antarctica Ice Movie	CH 19 (4 <sup>th</sup> Ed: CH 16)
W Apr 7	<b>Wellness Day (no class)</b>	
M Apr 12	Lec 19 Human impacts: Global climate change <b>LAB PRACTICAL II</b> <b>Discussion: How to give an effective science presentation</b>	CH 3 (4 <sup>th</sup> Ed: CH 19)
W Apr 14	Lec 20 Introduction to fisheries biology Human impacts: Fisheries and food from the sea Case study of Native Hawaiian lessons in fisheries management	CH 17 <b>Reading: Pauly 1995 and Wilcox 2012 (posted on Blackboard)</b>
M Apr 19	Lec 21 Biodiversity, conservation and MPAs <b>Lab 9: Special Topics Presentations I</b>	Peer participation in presentations <b>HW#7a</b> presentation
W Apr 21	Lec 22 Human impacts: Pollution part 1 nutrients	
M Apr 26	Lec 23 Human impacts: Pollution part 2 – plastics <b>Lab 10: Special Topics Presentations II</b>	<b>Reading: Pacific Garbage Patch</b> <b>HW#7b</b> presentations
W Apr 28	Lec 25 Human impacts: Marine invasive species	CH 17
M May 10	<b>FINAL EXAM 2:00-4:00 pm</b>	

**Lecture Exams:**

There will be two 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.

**Laboratory:**

You are required to attend all lab sessions. Any unexcused absences, late arrivals or early departures will seriously affect your evaluation. Laboratory activities will include activities that emphasize how the ocean works and how marine biologists test their ideas, through quantitative observations, models, and manipulative, controlled, and replicated experiments.

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 the USC computing center laptop checkout webpage:

<https://itservices.usc.edu/spaces/computingcenters>.

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

**Laboratory Practical:** The two lab practical exams will test your understanding of the topics and exercises covered in the laboratory sessions. *Missed laboratory practical exams cannot be made up.*

**Lab Reports:** Lab reports will be submitted using a TurnItIn link on Blackboard unless otherwise specified.

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

## Academic Conduct:

*Course Community and Discussion Conduct:*

- Share responsibility for including all voices in the conversation.
- Listen respectfully.
- Be open to changing your perspectives based on what you learn from others.
- Understand that we are bound to make mistakes in this space.
- Understand that your words have effects on others.
- Take pair/group work seriously.
- Understand that others will come to these discussions with different experiences from your own.
- Make an effort to get to know other students.
- Understand that there are different approaches to solving problems.

**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, [policy.usc.edu/scientific-misconduct](http://policy.usc.edu/scientific-misconduct).

## Course-specific Policies

**Attendance and participation:** Students are strongly encouraged to attend synchronous course activities (Zoom meetings). Active participation in class is necessary. However, synchronous sessions will be recorded and available through Blackboard. Students who miss Zoom meetings are responsible for finding out about any in-class announcements and activities, and must contact the instructor for alternate assignments.

**Late assignments:** Late assignments must be uploaded to Blackboard/TurnItIn (as specified for each assignment or activity). Unless otherwise specified late assignments incur a 5% starting 15 minutes after the deadline and 5% additional for each 24 hrs late.

**Missed exams:** UNPLANNED ABSENCES: You may be excused from an exam only in the event of a documented illness or emergency as outlined by university policy, with notification to the instructor 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. If you have an emergency on exam day, please contact the instructor as soon as you are able (preferably, before the exam).

PLANNED ABSENCES: Students that miss an examination or graded 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, you **must** email the instructors *two weeks in advance* to see if alternative arrangements can be made (under reasonable circumstances). Otherwise, make-up exams will not be given except in extreme emergencies (see above).

**Policy on Re-grades:** Assignments 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 must: 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.

### **Online Learning Experience**

Current conditions have added new challenges to the semester. Although Fall 2020 will be atypical, I will work to engage each and every one of you to the best of my abilities! However, you should take steps to make the experience as beneficial for you as possible. If you have logistical or technology related issues that are impacting your learning experience and ability engage with the class (such as internet connectivity, or other obstacles) you can contact me and I will try to help or will refer you to someone that may assist you.

### **Zoom/online live meeting etiquette**

A few reminders for getting the best experience in online lecture/discussion:

- PLEASE NOTE: synchronous session will be recorded and distributed on Blackboard
- Please mute your microphone when not speaking
- Use of webcam is encouraged and preferred. Please dress appropriately for a classroom environment
- You can use virtual backgrounds if you prefer to keep your home background environment private
- Headphones with a microphone are effective in minimizing interference from background noise
- You can use the Zoom chat or hand raise functions for questions/comments during sessions
- Come to synchronous meetings prepared

### **Synchronous session recording notice**

Synchronous sessions will be recorded and provided to all students asynchronously via Blackboard.

### **Sharing of course materials outside of the learning environment**

*Reminder:* USC policy prohibits sharing of any synchronous and asynchronous course content outside of the learning environment:

*SCampus Section 11.12(B)*

*Distribution or use of notes or recordings based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study is a violation of the USC Student Conduct Code. This includes, but is not limited to, providing materials for distribution by services publishing class notes. 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 relationship to the class, whether obtained in class, via email, on the Internet or via any other media. (See Section C.1 Class Notes Policy).*

### **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.

### **Assignments and Grades:**

Final grades will be determined on the following scale (*may be adjusted based upon class progress*) based on the total points (approximately) described in below:

Grade	Percent	Grade	Percent
A	95-100	C	73-76
A-	90-94	C-	70-72
B+	87-89	D+	67-69
B	83-86	D	63-66
B-	80-82	D-	60-62
C+	77-79	F	59 and below

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	15		
HW#5_Exp. Design	10		
HW#6_Presentation Outline and Faculty Meeting	15		
HW#7_e-copy Scientific PowerPoint Presentation	15		
		<b>86</b>	<b>12.68%</b>
Midterm Exams 1 and 2 (200 points each)	400		
		<b>400</b>	<b>59.00%</b>
<b>Labs</b>			
1_Marine invertebrate diversity lab workbook	15		
Participation in BHL search	5		
2_Respirometry prelab	5		
2_Respirometry lab report	15		
3_Bivalve prelab	4		
3_Bivalve feeding study and dissection lab activity	15		
4_Exp design prelab	4		
4_Exp design worksheet	15		
<b>Lab Practical I</b>	15		
5_Catalina field experiment	20		
6_Coral photogrammetry	20		
7_Biodiversity prelab	4		
8_Biodiversity lab in-class data workup – bring	15		
<b>Lab Practical II</b>	15		
9_Special Topics student presentations	25		
Student presentation participation in other's talks			
		<b>192</b>	<b>28.32%</b>
<b>TOTAL</b>		<b>678</b>	<b>100%</b>



## Academic and Student Support Systems

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

*National Suicide Prevention Lifeline* - 1 (800) 273-8255 – 24/7 on call; [suicidepreventionlifeline.org](http://suicidepreventionlifeline.org)  
Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

*Relationship and Sexual Violence Prevention Services (RSVP)* - (213) 740-9355(WELL), press “0” after hours – 24/7 on call; [studenthealth.usc.edu/sexual-assault](http://studenthealth.usc.edu/sexual-assault). Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

*Office of Equity and Diversity (OED)* - (213) 740-5086 | Title IX – (213) 821-8298; [equity.usc.edu](http://equity.usc.edu), [titleix.usc.edu](http://titleix.usc.edu).  
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) 740-5086 or (213) 821-8298; [usc-advocate.symplicity.com/care-report](http://usc-advocate.symplicity.com/care-report). Avenue to report incidents of bias, hate crimes, and microaggressions to the Office of Equity and Diversity | Title IX for appropriate investigation, supportive measures, and response.

*The Office of Disability Services and Programs* - (213) 740-0776; [dsp.usc.edu](http://dsp.usc.edu). Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

*USC Campus Support and Intervention* - (213) 821-4710; [campussupport.usc.edu](http://campussupport.usc.edu). Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

*Diversity at USC* - (213) 740-2101; [diversity.usc.edu](http://diversity.usc.edu). 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; [dps.usc.edu](http://dps.usc.edu), [emergency.usc.edu](http://emergency.usc.edu).  
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) 442-120 – 24/7 on call; [dps.usc.edu](http://dps.usc.edu)  
Non-emergency assistance or information.