

Instructors:

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Textbooks: Lecture: Jeffrey Levinton, 2014, Marine Biology Function, Biodiversity, Ecology
Laboratory: Materials provided

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

Lecture times: M/W 2:00 - 3:20pm (two lectures per week) VKC 101
Laboratory time: W 3:30 - 6:30pm (one lab per week) ZHS 460

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; impacts of humans on the ocean and conservation. Lecture periods may 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; recommended BISC 315 (students with BISC 103 can request waiver).

General objectives of the course

Through lectures, laboratories, and projects you will gain 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 on one's own and as part of a group; and
- 4) In-depth of knowledge of a specific sub-discipline of marine biology.

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

- 1) Explain how components of physical oceanography (temperature, salinity, DO, nutrients, water currents and tides) 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.
- 2) Explain the life processes of photosynthesis and cellular respiration and where they occur in the cells of marine organisms reflecting on the environmental limitations of the ocean.
- 3) Identify the major phyla that occur in particular marine habitats (e.g., plankton, nekton, intertidal and subtidal, deep ocean, etc), and describe major aspects of their natural history, including listing their unique adaptations for marine life.

- 4) Differentiate important ecological relationships (e.g., predator-prey, competition, symbiosis, indirect effects), and explain their influence on distribution and abundance patterns and community structure.
- 5) Recognize how humans impact marine ecosystems and organisms at multiple scales.
- 6) Apply different sample and analysis methods in marine ecology and physiology and interpret experimental results through written research reports.
- 7) Formulate hypotheses, develop a research proposal, and conduct a research study to investigate a particular problem in marine biology. Work as part of a team to design the research project, carry it out effectively, and then present the results in both oral and written formats.

Schedule of lecture topics *Note that the schedule is subject change. Any schedule changes will be discussed in class and posted on Blackboard.*

Day	Activity	Ins.	Readings and Assignments
M Jan 8	Lec 1 Introduction to marine biology and the Marine Environment	KH	CH 1, 2 HW#1: Student questionnaire HW #2 Ocean Map
W Jan 10	Lec 2 Physical/chemical marine environment No Lab this week – read CH 12 text for Lab 1 next week	KH	CH 2, 4
M Jan 15	Martin Luther King Holiday – NO CLASS		
W Jan 17	Lec 3 Ecological and evolutionary principles of Mar Biol Lab 1 Phytoplankton & Marine Invertebrate Diversity Lab	CK	CH 3 Diversity Lab Notebook check
M Jan 22	Lec 4 Marine ecophysiology Watch: http://nationalgeographic.org/media/plankton-revealed/	CK	CH 4 HW #3 SimBio Liebig's Barrel
W Jan 24	Lec 5 Reproduction, dispersal and migration Note: 1/27 Last day to Drop with a W Lab 2 Population connectivity and community diversity	CK	CH 6 Prelab: some R refresher course online (HW #1 -Worksheet)
M Jan 29	Lec 6 Molecular tools in marine ecology & evolution	CK	CH 7, p. 158-161 Primary Literature reading (TBD)
W Jan 31	Lec 7 Benthic life I (Plants, Inverts) Lab 3 Bivlave Lab Overview of how to write a scientific paper	CK	CH 11, 12 HW#4 SimBio Exp Design Worksheet (dissection) Lab Report
M Feb 5	Lec 8 Benthic life II (Inverts, physiology)	CK	CH 5, 12, 13
W Feb 7	MIDTERM 1 (Lectures 1-8) Lab 4 Respirometry Lab		 Lab Report
M Feb 12	Lec 9 Plankton I (prokaryotes/microbial eukaryotes) Watch: http://nationalgeographic.org/media/plankton-revealed/	KH	CH 7 HW #2: SimBio Leibig's Barrel
W Feb 14	Lec 10 Plankton II (zooplankton) LAB PRACTICAL I	KH	CH 7
M Feb 19	Presidents Day – NO CLASS		
W Feb 21	Lec 11 Food web patterns & processes Differential productivity in the world's oceans Lab 5 Zooplankton Diversity Lab	CK	CH 9,10 Respiration Lab Write Up Due

M Feb 26	Lec 12 Marine vertebrates, part 1	KH	CH 8
W Feb 28	Lec 13 Marine vertebrates, part 2 Lab 6 SimBio Keystone Predator Module	KH	CH 8 and section 18.2, pg. 479
M Mar 5	Lec 14 Coastal Ecosystems I (intertidal)	KH	CH 14
W Mar 7	Lab 7 [Insert cove] field trip 2:00-6:30p		HW #3: Worksheet
Mar 12/14	SPRING BREAK		
M Mar 19	Lec 15 Coastal Ecosystems II (subtidal 1)	CK	CH 15; 16
W Mar 21 Mar 23-25	Lec 16 Coastal Ecosystems III (subtidal 2) (Watch Chasing Coral Netflix movie before class) Lab 8: REQUIRED Catalina Island Weekend Field Trip (Shark Harbor mole crab lab; zooplankton collection, bioluminescence and dock work)	CK	CH 15; Knowlton and Jackson 2008 (on BB); Normile 2016 HW#4 Lab Packet
M Mar 26	Lec 17 Deep sea biology and bioluminescence Read: http://discovermagazine.com/2009/jul-aug/05-earths-aliens-light-up-live-deep	KH	CH 16; Widder 2010_Science.pdf (on BB) Also, web-based article on the left
W Mar 28	MIDTERM 2 (Lectures 9-16) No labs because of Catalina field trip		
M Apr 2	Lec 18 Polar environments	CK	CH 16; HW #5: Under the Antarctica Ice Movie Assignment
W Apr 4	Lec 19 Human impacts: Global Climate Change LAB PRACTICAL II	CK	CH 19
M Apr 9	Lec 20 Human impacts: Fisheries and food from the sea 1) Native Hawaiians provide lessons in fisheries management http://blogs.discovermagazine.com/science-sushi/2012/03/23/native-hawaiians-provide-lessons-in-fisheries-management/#.WHKFvJJucn2 2) Sustainable ancient aquaculture http://blogs.discovermagazine.com/science-sushi/2012/03/23/native-hawaiians-provide-lessons-in-fisheries-management/#.WHKFvJJucn2	CK	CH 18 Reading: weblinks provided
W Apr 11	Lec 21 Human impacts: Marine invasive species Lab 9: suggest Cal Sci Ctr Trip?	KH	CH 17 HW #6: CA Science Center Worksheet
M Apr 16	Lec 22 Human impacts: Pollution part 1 nutrients	KH	
W Apr 18	Lec 23 Human impacts: Pollution part 2 – plastics http://discovermagazine.com/2008/jul/10-the-worlds-largest-dump/?searchterm=ocean%20plastic Lab: Special Topics Presentations I	KH	Reading web link to left
M Apr 23	Lec 24 Biodiversity, Conservation and MPAs	KH	CH 17
W Apr 25	Lec 25 Review and catch up	KH/	

	Lab: Special Topics Presentations II	CK	
M May 8	FINAL EXAM 2:00-4:00 pm (Lectures 17-24)		

LAB SCHEDULE (subject to modification of specific topics and assignments):

Day	Activity	Comments
Week 1 Jan 9/11	Lab 1: Introduction to Marine Biology Lab Overview/ Properties of Seawater Lab	HW #7 Prop of sw worksheet due at end of lab
Week 2 Jan 16/18	Martin Luther King Holiday NO LABS	
Week 3 Jan 23/25	Lab 2: Phytoplankton and Marine Invertebrate Diversity Lab Pre-lab: Read CH 12 class text	Diversity Lab notebook check
Week 4 Jan 30/Feb 1	Lab 3: Snail morphology and behavior lab	Prelab Snail Lab Worksheet
Week 5 Feb 6/8	Lab 4: Bivalve feeding study and dissection Overview of how to write a scientific paper.	Worksheet (dissection) Lab Report assigned on mussel feeding experiment
Week 6 Feb 13/15	Lab 5: California Science Center Field Trip (during lab time)	CA Science Center worksheet
Week 7 Feb 20/22	MONDAY President's Day NO LABS Presentation topic due to Turn it in with two other sources (optional: rough outline, if feedback desired).	Mussel lab write up due
Week 8 Feb 27 Mar 1	LAB PRACTICAL I Lab 6: SimBio Keystone Predator Module	
March 3-5	Lab 7: REQUIRED Catalina Island Weekend Field Trip (Shark Harbor mole crab lab; zooplankton collection and dock work)	
Week 9 Mar 6/8	No labs because of weekend field trip	
Week 10 Mar 13/15	SPRING BREAK	
Week 11 Mar 20/22	Lab 8: Zooplankton Diversity Lab (using samples from Catalina)	
Week 12 Mar 27/29	Abalone Cove Intertidal Zone Field Trip (Mar 27 2:00-6:30)	Worksheet
Week 13 Apr 3/5	Lab 9: Feeding behavior lab	Worksheet
Week 14 Apr 10/12	LAB PRACTICAL II Discussion: How to give an effective presentation	
Week 15 Apr 17/19	Student presentations on special topics	Peer evaluation sheets
Week 16 Apr 24/26	Student presentations on special topics	Peer evaluation sheets

Quizzes and Exams

Lectures: There will be three lecture exams (200 pts each), and 11 lecture quizzes given through Blackboard or by handout (6 pts each; only 10 counted in final grade). Questions on quizzes and exams will be a combination of multiple choice, short answer, problem sets, fill in the blank and essays.

All exams will be held in our regular lecture room. THERE WILL BE NO SCHEDULED MAKE-UP EXAMS. If you have any anticipated problem due to athletic schedules or religious holidays see me by WEEK 2 of the course.

Labs:

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.

Some labs will be in the field. Working outdoors is a great way to see organisms in their natural habitats. Plan to dress appropriately for each proposed activity and bring water. **There are three required field trips (see schedule).**

Laboratory Practicals:

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 or you will deprive yourself of the time other students have.

Missed Practicals cannot be made up.

Reviews of primary literature

Additional readings for specific lectures or labs will be posted on Blackboard during the semester. Some lecture quiz points may be allocated to information from these reading assignments.

Course Policies

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

Exams

The lecture portion of this course will include three midterm exams (Midterm 3 is the Final). Exams may include multiple choice questions, fill-in answers, definitions, T/F, short answers, and short or long essays. Material will be drawn from lectures, reading, laboratory material, and problem set material. The final will focus heavily on the third portion of the exam, but may also have cumulative questions.

Policy on Re-grading Examinations

If you feel that an error was made in the grading of an examination, you need to do the following: 1) Check the posted answer key, 2) Prepare a printed statement explaining why you feel your grade was incorrect, and 3) submit this and your original examination to your instructor within one week of the time the examination was returned to you. Your entire exam 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 turned in to me or the TA personally. Late assignments will be penalized 10% of a grade per day.

Class and Lab 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. Since this course will be interactive and will require you to work closely with others, part of your grade will be dependent on your ability and

willingness to participate in class discussions and laboratory investigations, as well as interact positively with other members of the class. Attendance in the laboratory is graded on not just “occupying space” but participating, knowing the proper use of equipment, and cleaning up your lab bench at the end of lab. Students are also expected to be on time and have active participation in all field trip activities.

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

UNPLANNED ABSENCES: You may be excused from an exams or labs only in the event of a documented illness or emergency as outlined by university policy. No other excuses for missing exams will be accepted. If you miss a class or lab exam, quiz or graded activity due to medical illness you must present a valid medical excuse to the TA or Instructor within 48h of the missed examination or quiz. Notify the TA and Instructor in writing that you were seen by a physician, making sure that you include: 1) the physician’s name and telephone number, and 2) a statement authorizing us to discuss with the doctor whether you were too ill to take the examination. Note that neither you nor the physician need tell us the nature of your illness. 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 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>. Requests for such absences should be made by email to the Instructor at least 2 weeks in advance of the absence. If the absence is approved, a reasonable accommodation will be provided. You may request permission to attend a different lab section for a reasonable excuse.

Students with Disabilities

Students requesting academic accommodations based on a disability are required to register with the Office of Disability Services and Programs (DSP) each semester and provide a letter of verification for approved accommodations. Be sure that the letter is delivered as early in the semester as possible. The telephone number of DSP is 213-740-0776. If a student’s approved accommodation is limited to extra time on examinations, accommodation will be provided. For any other accommodation, such as a private room, translator, etc., students must make prior arrangements with the DSP office 2 weeks before the exam date. See: http://sait.usc.edu/academicssupport/centerprograms/dsp/home_index.html.

Statement on Academic Integrity

Ethics of academic integrity is a primary focus of the course. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one’s own academic work from misuse by others as well as to avoid using another’s work as one’s own. All students are expected to understand and abide by these principles. SCampus, the Student Guidebook, contains the Student Conduct Code in Section 11.00: <http://web-app.usc.edu/scampus/1100-behavior-violating-university-standards-and-appropriate-sanctions/>, while the recommended sanctions are located in Appendix A. Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: <http://www.usc.edu/student-affairs/SJACS/>.

Website

Postings on Blackboard (<https://blackboard.usc.edu>) will be an official source for announcements, course materials, lecture notes, grade postings and general discussions. We may also use Blackboard for lecture or laboratory quizzes. Students are responsible for checking the course website on a regular basis.

Laboratory Performance guidelines

1. 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.
2. NO EATING OR DRINKING IS ALLOWED IN THE LABORATORY.
3. 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. Quizzes will consist of multiple choice questions and/or fill-in-the-blanks. Questions will cover knowledge of the material you will be covering that day in lab, and the results from the previous lab.
3. LAB WORK SUMMARIES OR WRITE-UPS: During each lab students need to record their results (drawings, observations, calculations) in their lab notebook or provided worksheet. Tables need to be filled and all post-lab questions answered. Each student is required to show his/her TA the lab workbooks before leaving the lab. Your TA will provide details on lab requirements and expectations for each specific lab.
4. 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. Lab report guidelines will be posted on BB (<https://blackboard.usc.edu/>) in the beginning of the semester.
5. LAB EXAMS: The two lab practical exams will test your understanding of the topics and exercises covered in the laboratory sessions.
6. PRESENTATION: Detailed instructions for preparing your presentation, including how points will be assigned, will be provided on Blackboard (<https://blackboard.usc.edu/>).
7. BLACKBOARD: Blackboard will be used to distribute course materials and announcements and grades. Lecture and lab grades will also be available on Blackboard: <https://blackboard.usc.edu>. It is the student's responsibility to notify his/her TA or Instructor ASAP in the event of any mistakes, so please check your scores on Blackboard weekly.
8. GRADES: The final letter grade will be assigned on a curve, determined by the total number of points as follows. The course may be curved at the end of the semester based on the class grade distribution

Lecture	Points possible
HW#1_student questionnaire	6
HW#2_ocean map	10
HW#3_Sim Bio Lieberg's Barrel	10
HW#4_SimBio Exp Design	10
HW#5_Guest speaker follow-up	5
HW#6_Under the Antarctica Ice Movie Assignment	5
	46
	4.6%

Exam 1	200	
Exam 2	200	
EXAM 3 (Final)	200	
	600	60.0%
Labs		
1_ Properties of sw worksheet and graph	15	
2_ Marine invertebrate diversity prelab	4	
2_ Marine invertebrate diversity lab_notebook	15	
3_ Snail prelab	4	
3_ Snail lab worksheet	15	
4_ Bivalve prelab	4	
4_ Bivalve feeding study and dissection_lab activity	8	
4_ Bivalve feeding study research report	40	
5_ CA science center field trip worksheet	15	
Presentation topic +2 additional sources	5	
Lab practical 1	25	
6_ SimBio Keystone predator lab	10	
7_ Catalina Island field trip worksheet 1	10	
7_ Catalina Island field trip worksheet 2	10	
8_ Zooplankton diversity data	5	
8_ Zooplankton lab research report	40	
9_ Aplysia prelab	4	
9_ Aplysia feeding lab worksheet	15	
10_ Abalone cove participation	10	
10_ Abalone cove worksheet/graphs	20	
11_ Lab practical 2	25	
12_ Student presentation_peer participation	10	
12_ Student presentation_oral report and ppt	25	
12_ Student paper	25	
	354	35.4%
TOTAL	1000	
Extra credit: 5 pts for completion of course evaluations	5	