

**Instructor:**

Dr. Karla Heidelberg

Office Hours: TBA

Location: SOS B15

Email: [kheidelb@usc.edu](mailto:kheidelb@usc.edu)

Dr. Naomi Levine

Office Hours: TBA

Location: AHF M225

Email: [n.levine@usc.edu](mailto:n.levine@usc.edu)

Textbooks: Lecture: David Townsend, 2012, *Oceanography and Marine Biology: An Introduction to Marine Science*  
 Laboratory: Materials provided

Website: <https://blackboard.usc.edu> (course associated materials and grades)

Lecture times: T/Th 12:30-1:50 (two lectures per week) KAP 150

Laboratory time: Th 3:00 - 6:00pm (one lab per week) ZHS 469

**Course Overview**

This course will cover the basics of biological, physical, and chemical dynamics in the oceans with a particular emphasis on life in different ocean environments. Specific topics include primary production of phytoplankton, secondary production by zooplankton, bacterial remineralization, physiology and ecology of fishes, and marine mammals.

Prerequisites: BISC 120 or 120; BISC 220 or 221 (*students with BISC 103 can request prerequisite 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 Biological Oceanography:

- (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 knowledge of the sub-discipline of biological oceanography.

Schedule of lecture topics (*subject to modification of specific topics and reading assignments*):

Day	Activity		Readings
T Aug 23	Lec 1 Introduction to the marine environment	NL	TBD
Th Aug 25	Lec 2 History of Oceanography	KH	Ch 1
T Aug 30	Lec 3 Geology: Earth's structure, sediments, paleoceanograph	NL	Ch 3 Assignment 1
Th Sept 1	Lec 4 Water chemistry and properties of water	NL	Ch 4
T Sept 6	Lec 5 General circulation in the oceans	NL	Ch 5 Assignment 2
Th Sept 8	Lec 6 Light and photosynthesis	NL	Ch 8
T Sept 13	Lec 7 Nutrient cycles and limiting factors	NL	Journal article Assignment 3
Th Sept 15	Lec 8 Observing the oceans	NL	Journal article
T Sept 20	<b>MIDTERM I (Lectures 1-8)</b>	NL	
Th Sept 22	Lec 9 Primary production and primary producers	NL	Ch 8
T Sep 27	Lec 10 Oceanic bacteria and archaea	KH	Ch 8

Th Sep 29	<i>No lecture, Fermin fieldtrip</i>	KH	
T Oct 4	Lec 12 Grazers and food webs	KH	Ch 9
Th Oct 6	Lec 13 Modeling the ocean system	NL	Journal article
Oct 7 -9 <sup>th</sup> weekend	<b>WMSC FIELD TRIP</b>	KH/NL	
T Oct 11	Lec 14 Topics of Interest: Ocean Acidification and its impacts	NL	Journal article Assignment 4
Th Oct 13	Lec 15 Marine Environments	KH	Ch 12
T Oct 18	Lec 16 El Niño	NL	Journal article
Th Oct 20	Lec 17 Tides and Waves	KH	Ch 6
T Oct 25	<b>MIDTERM II (Lectures 9-17)</b>		
Th Oct 27	Lec 18 <i>No class – makeup for WMSC field trip</i>		
T Nov 1	Lec 19 Benthic environments	KH	Journal article
Th Nov 3	Lec 20 Hydrothermal vent systems/Hydrocarbon seeps. Case Study: Deep Horizons oil spill	NL	Journal article Assignment 5
T Nov 8	Lec 21 Marine Pollution/Marine Debris	KH	Ch 15
Th Nov 10	Lec 22 Estuaries, Part I: physical structure; Watershed activity	KH	Ch 15
T Nov 15	Lec 23 Estuaries, Part II: biological structure	KH	Journal article Assignment 6
Th Nov 17	Lec 23 Marine Fisheries and Aquaculture and MPAs	KH	Ch 11, 14
T Nov 22	Lec 25 <i>NO CLASS (Wrigley weekend make-up)</i>		
Th Nov 24	<b>THANKSGIVING</b>		
T Nov 29	Lec 24 Oceanography in Polar Zones	KH	Ch 12 Assignment 7
Th Dec 1	Lec 27 Student Presentations	KH/NL	
	<b>FINAL EXAM (Lectures 18-27)</b>		

The above schedule is tentative and is subject to change. Any schedule changes will be discussed in class and posted on Blackboard. Students who miss classes are responsible for finding out about announcements.

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

Week/Day	Activity		Assignments/ Comments
Aug 25	Lab 1 Species identification lab (phytoplankton and inverts) & Lab tour	KH	Worksheet 1
Sept 1	Lab 2 Seawater density lab	NL	Worksheet 2
Sept 8	Lab 3 Pigment lab	NL	Worksheet 3
Sept 15	Lab 4 Nutrient modeling/Stella Lab	NL	Worksheet 4
Sept 22	Lab 5 <i>Lab shifted to Wrigley weekend fieldtrip</i>		
Sept 29	<b>Lab 6 Intertidal lab –Ferman Point</b>	KH	Worksheet 5
Oct 6	Lab 7 Stella ecosystem model	NL	Worksheet 6
Oct 7 <sup>th</sup> -9 <sup>th</sup>	<b>USC Wrigley Institute for Environmental Studies (Friday night departure; Sunday midday return)</b>	NL/KH	Lab report
Oct 13	Lab 8: Ocean acidification lab	NL	Worksheet 7
Oct 20	Lab 9 Mini - presentations	NL/KH	
Oct 27	Lab 10 <i>Lab shifted to Wrigley weekend fieldtrip</i>		
Nov 3	Lab 11 Comparative zooplankton analysis	KH	Worksheet 8
Nov 10	Lab 12 Boundary layers; Water flow and feeding	KH	Worksheet 9
Nov 17	Lab 12 California Science Center – Food Webs	KH	Worksheet 10

Nov 24	THANKSGIVING		
Dec 1	Student Presentations	NL/KH	Presentation materials due

### Quizzes and Exams

Lectures: There will be two lecture exams (200 pts each), and 11 lecture quizzes given through Blackboard or by handout (10 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.

### 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 a paper review.

### Research Presentation

Each student will be assigned a research topic which they will develop a research presentation based on the primary literature. Depending on class size, students will work alone or in teams of 2. A detailed metric of instructions and expectations will be posted on BlackBoard.

### 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 biologists test their ideas, through quantitative observations, models, and manipulative, controlled, and replicated experiments. Students will conduct group projects that will involve sampling and collecting data. Each student will submit a lab report, which includes a discussion of relevant primary literature and a data summary. Each group will discuss its findings in class.

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 multiple field trips**, some of which fall within the normal lab time.

Full lab reports should be formatted as in the example below. Pages should be numbered. Use 12 point font, double spaced. Lab reports will be submitted using 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 Blackboard (<https://blackboard.usc.edu/>).

#### General format

**Title page** (project title, date, course, your name)

**Introduction 2-3 pages** (introduce topic, related literature, and your project)

**Materials and Methods 2-3 pages** (state what sampling methods were used and where you sampled)

**Results and Discussion 2-3 pages** (state what you found including data in tables; what it tells us about the project topic)

**Literature Cited** (list all references you mentioned) as needed using an accepted format found in a major journal for the topic.

### Grading:

#### Exams

Exams will be held in our regular lecture room. 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.

The University's policy on absences due to athletic schedules or religious holidays is 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, although notice at the beginning of the semester is better. If the absence is approved, a reasonable accommodation will be provided.

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

**UNPLANNED ABSENCES:** The general University policy is that you may be excused from an exam or labs only in the event of a documented illness or emergency as outlined by university policy. If you miss a class or lab exam, quiz or graded activity due to medical illness you must present a valid medical excuse within 48h of the missed exam or graded event. The reason for missing an examination or quiz must be of a medical nature or totally unavoidable (e.g., a verified automobile collision on the day and time of the examination). Remember that the USC Student Health Center does not provide routine medical excuses. Notify the 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. If the excuse is valid, we will accommodate needs. 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.

### **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).

### **Grading policies**

Late assignments will be penalized 10% of a grade per day. Any document associated with grading may be photocopied by the instructional staff.

### **Class participation**

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. Students are also expected to be on time and have active participation in all field trip activities.

<b>Class</b>		<b>Labs:</b>	
Midterms x 2 (200 pts each)	400	Species ID lab (worksheet 1)	15
Class assignments (x 7)	70	SW density lab (worksheet 2)	15
Class participation	15	Nutrient lab (worksheet 3)	15
Final	200	Intertidal lab (field work)	15
		Intertidal lab data work up (worksheet 4)	15
		Ecosystem modeling (worksheet 5)	15
		Pigment lab (worksheet 6)	15
		Mini-lab presentation	35
		OA lab (worksheet 7)	15
		WMSD field trip	15
		WMSD lab report	35
		Zooplankton lab (worksheet 8)	15
		Boundary layer (worksheet 9)	15
		California Science Center (worksheet 10)	15
		Presentation outline	15
		Presentation	50
Class Total	685		
Lab Total	315		
<b>CLASS TOTAL</b>	<b>1000</b>		

The final letter grade will be assigned, possibly on a curve, determined by the total number of points as follows:

<b>GENERAL GRADING SCALE</b>		
90 - 100%	A	
80 - 89%	B	
65 - 79%	C	
55 - 64%	D	
0 - 54%	F	

### Students with Disabilities

Students requesting academic accommodations based on a disability are required to register with the Office of Disability Services and Programs (DSP; 213-740-0076) each semester. DSP can provide a letter specifying accommodations. If a student's approved accommodation is limited to extra time on examinations, accommodation will be provided. Students must make prior arrangements with the DSP office *2 weeks before* the first exam date. For more information visit: [http://sait.usc.edu/academicsupport/centerprograms/dsp/home\\_index.html](http://sait.usc.edu/academicsupport/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/>. 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. Students are responsible for checking the course website on a regular basis.

### **Laboratory Performance guidelines**

1. You are required to be on time and attend all lab sessions. Any unexcused absences or early departures will seriously affect your evaluation. At the end of the lab session, clean and return all supplies to their proper place, and clean your work area. Check with your instructor before leaving. **NO EATING OR DRINKING IS ALLOWED IN THE LABORATORY.**

If you have to miss a lab for a legitimate reason, we will prorate your grade for that lab based on other grades of comparable points. If you miss a lab with a major write up, you will be assigned another lab for a full write-up. Note that this may involve extra sampling work or analysis.

2. **PRE-LAB QUIZZES:** There may be a multiple choice and/or fill-in-the-blank pre-lab quiz 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.

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 the lab workbooks whenever asked for spot check grades. We will cover details on lab requirements and expectations for each specific lab.

4. **LAB FINAL:** The lab final will test your understanding of the topics and exercises covered in the laboratory sessions. You will have a written portion and a practical portion (being able to use a microscope to identify different organisms or a piece of equipment to determine a measurement).

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

6. **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 Instructor ASAP in the event of any mistakes, so please check your scores on Blackboard weekly.