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| **Instructors:**  Dr. Naomi Levine  Office Hours: Th 10-12pm  Location: AHF M225  Email: [n.levine@usc.edu](mailto:kheidelb@usc.edu) | Dr. Cameron Thrash  Office Hours: F 11am-1pm  Location: AHF 209  Email: [thrash@usc.edu](mailto:thrash@usc.edu) |

**TA:**

Office Hours: Th 12-2pm

Location:

Email:

Textbooks: 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 2:00 - 3:20 (two lectures per week)

Laboratory time: T 3:30 - 6:20pm (one lab per week)

**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 121; 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 and labs (*subject to modification of specific topics and reading assignments*):**

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| --- | --- | --- | --- | --- |
| **Day** | **Activity** |  | **Readings** | **Assignments** |
| 08/18 | Lec 1 Geology: Earth’s structure, sediments,  paleoceanography | NL | Ch 1 |  |
| 08/20 | Lec 2 The Bio in BioOce | CT |  |  |
| 08/25 | Lec 3 Water chemistry and properties of water  Lab 1 Seawater density lab | NL | Ch 4 | Worksheet 1 |
| 08/27 | Lec 4 General circulation in the oceans | NL | Ch 5 | Assignment 1 |
| 09/01 | Lec 5 Circulation 2 – OMZ physics | CT |  |  |
| 09/03 | Lec 6 Tides and Waves | CT | Ch 6 |  |
| 09/08 | Lec 7 Energy for life 1: phototrophy  Lab 2 Eunice lab | NL | Ch 8 | Worksheet 2 |
| 09/10 | Lec 8 Primary producers | NL | Ch 8 |  |
| 09/15 | Lec 9 Energy for life 2: chemotrophy  Lab 3 Flow cytometry lab | CT | Journal article | Assignment 2  Worksheet 3 |
| 09/17 | Lec 10 Observing the oceans | NL | Journal article |  |
| 09/26 | **Biological Oceanography Research Vessel  R/CV Yellowfin**  **FIELD TRIP** |  |  | Lab report |
| 09/22 | **MIDTERM I (Lectures 1-9)** |  |  |  |
| 09/24 | Lec 11 Nutrient cycles | NL | Journal article | Assignment 3 |
| 09/29 | Lec 12 Limiting factors  Lab 4 Nutrient modeling/ Introduction to Stella | NL | Journal article | Worksheet 4 |
| 10/01 | Lec 13 Biological pump and Carbon export | CT | Journal article |  |
| 10/06 | Lec 14 Dissolved Organic Carbon  Lab 5 Stella ecosystem model Lab | CT | Journal article | **Final project topic due**  Worksheet 5 |
| 10/08 | Lec 15 Microbial loop and zooplankton  Lab 6 BioInformatics Lab 1 | CT | Ch 9 | Worksheet 6 |
| 10/13 | Lec 16 Omics approach to oceanography  Lab 7 BioInformatics Lab 2 | CT | Journal article | Worksheet 7 |
| 10/15 | **MIDTERM II (Lectures 10 - 15)** |  |  |  |
| 10/20 | Lec 17 Oxygen Minimum Zones  Lab 8 WMSC data analysis | CT | Journal article | Assignment 4 |
| 10/22 | Lec 18 Estuaries: physical structure; Watershed activity, biological structure | CT | Ch 12 pg 401-405 |  |
| 10/27 | Lec 19 Ocean Acidification and its impacts  Lab 9 Ocean acidification lab | NL | Journal article | Assignment 5  Worksheet 8 |
| 10/29 | Lec 20 Modeling the ocean system | NL | Journal article |  |
| 11/03 | Lec 21 History of Oceanography  Lab 10 History lab | CT | Ch 1 | Worksheet 9 |
| 11/05 | Lec 22 El Nino | NL |  |  |
| 11/10 | Student Presentations |  |  |  |
| 11/12 | Student Presentations |  | Final presentation and paper |  |
| TBD | **FINAL EXAM** |  |  |  |

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.

**Assignments and Worksheets**:

There will be 5 assignments given through Blackboard or by handout. Assignments and worksheets will be based on lab or lecture activities. Points for each are indicated in the table on page 5.

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| **Assignment** | **Content** | **Assigned** | **Due** | **Notes** |
| 1 | Ocean Circulation | 08/27 | 09/01 | Worksheet |
| 2 | Energy for life | 09/15 | 09/22 | Worksheet |
| 3 | Nutrient cycles | 09/24 | 10/01 | Journal article and questions |
| 4 | Oxygen Minimum Zones | 10/22 | 10/29 | Journal article and questions |
| 5 | Ocean Acidification | 10/29 | 11/05 | Journal article and questions |

**Exams**

The lecture portion of this course will include three midterm exams, with exam 3 being 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, readings, laboratory material, and problem set material. The final will focus heavily on the third portion of the exam,

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

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 Team 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.

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. Notify the Instructor in writing that you were seen by a physician, making sure that you include the physician’s name and telephone number. Note that neither you nor the physician need tell us the nature of your illness. 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) 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 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.

**Final Project**

Each student will choose a research topic from a list provided. The project will focus on a previous study done by a biological oceanographer and published in a peer-reviewed journal. The student will summarize this study and associated previous work that has been done on the topic and come up with a proposed “next steps” for a research study or experiment that would address unanswered questions related to the topic. Each student will prepare:

1. Bibliography of primary literature
2. 1-slide over-view of topic
3. Presentation
4. Paper

Further details of expectations regarding the final project will be posted on Black Board.

**Labs**

If in person, laboratory activities will include outdoor activities, bench side experiments, and computer-based modeling activities. These activities will emphasize how the ocean works and how biological oceanographers 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. If online, labs will involve similar exercises with at-home kits, data analysis, and simple computational projects.

**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.

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| **Class** |  | **Assignments** | |
| Midterms x 3 (200 pts each) |  | Ocean Circulation (Assignment 1) | 10 |
|  |  | Energy for life (Assignment 2) | 10 |
|  |  | Nutrient Cycles (Assignment 3) | 10 |
|  |  | Oxygen Minimum Zone (Assignment 4) | 10 |
|  |  | Ocean Acidification (Assignment 5) | 10 |
|  |  |  |  |
| **Final Project** |  | **Labs** |  |
| ‘1-slide’ presentation | 15 | Seawater density (Lab 1) | 15 |
| ‘1-slide’ feedback | 10 | Eunice Lab (Lab 2) | 15 |
| Peer-review feedback | 15 | Flow cytometry (Lab 3) | 15 |
| Final student presentation | 50 | Nutrient modeling (Lab 4) | 15 |
| Final presentation feedback | 15 | Stella ecosystem modeling (Lab 5) | 15 |
| Final presentation paper | 50 | BioInformatics #1 (Lab 6) | 15 |
|  |  | BioInformatics #2 (Lab 7) | 15 |
|  |  | Ocean Acidification (Lab 9) | 15 |
|  |  | History lab (Lab 10) | 15 |
| **Exam totals** | **600** | *Yellowfin experiments write-up* | 50 |
| **Class Assignments (x5) totals** | **50** |  |  |
| **Lab Totals** | **185** | **Questionnaires** |  |
| **Final Project** | **155** | Beginning of semester questionnaire/e-mail | 4 |
| **Class questionnaires** | **10** | End of semester eval completion | 6 |
|  |  |  |  |
| **CLASS TOTAL** | **1000** |  |  |

**Class participation**

Since this course will be interactive and will require you to work closely with others. We expect all students 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.

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

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| **GRADING SCALE** |
| 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>.

**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. Lecture and lab grades will also be available on Blackboard: [https://blackboard.usc.edu](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.

**Laboratory Performance guidelines**

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.

1. 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 work whenever requested. We will cover details on lab requirements and expectations for each specific lab.

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

**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](https://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](https://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](https://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](https://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](https://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](https://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](http://dps.usc.edu/)