

USC Dornsife

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College of Letters, Arts and Sciences

Geology 107 – Oceanography (4 units) Summer, 2022

Weekly Schedule: Two lectures per day (in-class, recorded) M T W Th plus one laboratory activity (asynchronous) M T W

Instructor: Steven P. Lund, Professor of Earth Sciences, USC

Contact: email: slund@usc.edu, blackboard, office hours

Course Description: This course introduces students to oceanographic processes active at the Earth's surface and their relationship to other components of the Earth's overall environment including climate variability and Global Change issues. Oceanographic processes include plate tectonics, ocean circulation, biogeochemical cycles, marine sedimentation, and marine biology/ecology. The course also surveys the relationship between oceanographic processes and the availability of mineral/energy resources and pollution problems. The laboratory associated with the course employs a hands-on approach to illustrate the methods that oceanographers use to develop an understanding of how the world's oceans work. The long-term objective is that students can use this information to understand the environmental conditions wherever they might be in the World and have the science concepts (building blocks) necessary to understand their surroundings and explain what they see. They can also use the information from this course to evaluate legislative/policy issues that they may be called upon to vote on or decide upon.

Learning Objectives: This course describes and explains specific observable components of the World's oceans. Each component (or building block, puzzle piece) can be combined with other components to explain more and more complicated aspects of ocean behavior. This hierarchical structure of combining science concepts (building blocks or puzzle pieces) to explain observed ocean behavior is called 'Earth System Science'. We use this approach in scientific research on the oceans and to predict future ocean behavior. Tests will assess knowledge of individual specific components of the oceans and evaluate whether students can combine simple components to describe more complicated aspects of the oceans.

Prerequisites: None. But a high-school understanding of basic science and mathematics is expected.

Course Notes: This is a mixed in-class and online course. Required class material will be available on blackboard (lecture PPTs, lab materials, grades). Parts of the course will be in-class lectures with synchronous (Zoom) recording and a laboratory component that will be asynchronous. Students will need a computer with internet access to assess the course materials.

Required Reading: There are no required readings other than the PPT presentations associated with the lectures. Students learn in different ways. For students who want a textbook for this course, I recommend 'Essentials of Oceanography', Trujillo and Thurman, 12th ed., Pearson Publ.. (I will provide an announcement on how to purchase the book before the start of class).

Assessments/Grading: The primary course assessment will be three 50-min in-class exams (multiple choice). Each exam will cover about 1/3 of the course. There will be on-line short quizzes associated with each lecture. There will be ten laboratory activities.

<u>Assignment</u>	<u>Points</u>	<u>% of grade</u>
3 exams	60	60
class quizzes	10	10
10 lab activities	30	30
TOTAL	100	100

Grading scale: total grades will be assigned on a curve with ~1/3 A, ~1/3 B, and ~1/3 C. A total grade of 50% or better is required to pass the course and get a C. Students not completing quizzes and lab activities could end up with a score below 50% and receive a D/F. Students must pass the laboratory component to pass the course.

Course Schedule:

<u>WEEK</u>	<u>DATE</u>	<u>LECTURE</u>	<u>CHAPTERS IN TEXT</u>
1	May 23	1: History of Oceanography	CH 1
1	May 23	2: Origin and Structure of the Earth	CH 2
1	May 24	3: The Earth's Ocean Basins	CH 3
1	May 24	4: Plate Tectonics - Historical Foundations	
1	May 25	5: Plate Tectonics - Current Views	
1	May 25	6: The Earth's Atmosphere and Global Heat Budget	CH 6
1	May 26	7: Atmosphere Circulation/Circulation of Fluids	CH 7
1	May 26	8: Ocean Waves and the Tides	CH 8,9
2	May 31	10: Surface Ocean Circulation - Driving Forces	
2	May 31	11: Surface Ocean Circulation - Patterns around the world	
2	Jun 01	12: The Nature and Properties of Sea Water	
2	Jun 01	FIRST MIDTERM EXAM (Lectures 1-11)	

2	Jun 02	13: The Variability of Water in the World's Oceans	CH 5
2	Jun 02	14: Deep Ocean Circulation	
3	Jun 06	15: Weathering and Erosion	
3	Jun 06	16: Marine Sedimentation	CH 4
3	Jun 07	17: Coastal Environments (photic zone and coastal margin)	CH 10
3	Jun 07	18: Beach Processes and Human Impact	
3	Jun 08	19: Nutrients and Dissolved Gases in World's Oceans	CH 12,13
3	Jun 08	20: Systematics of Marine Biology	CH 14,15
3	Jun 09	21: Marine Ecology and Food Webs	
3	Jun 09	22: Pelagic Marine Environment	
4	Jun 13	23: Deep Ocean Benthic Ecosystems	
4	Jun 13	24: Coastal Marine Environments	
4	Jun 14	25: Life cycles of California Grey Whale and Elephant Seals	
4	Jun 14	SECOND MIDTERM EXAM (Lectures 12-23)	
4	Jun 15	26: Coral Reef Environments	
4	Jun 15	27: Perspectives on Global Climate Change	
4	Jun 16	28: Paleooceanography – The Cretaceous Greenhouse World	CH 16
4	Jun 16	29: Paleooceanography - The Quaternary Icehouse World	
5	Jun 20	30: Today's World - Global Warming	
5	Jun 20	31: Today's World - ENSO Variability	
5	Jun 21	32: Managing Planet Earth: Ocean Resources-I	
5	Jun 21	33: Managing Planet Earth: Ocean Resources-II	
5	Jun 22	34: Managing Planet Earth: Ocean Pollution 1	
5	Jun 22	35: Managing Planet Earth: Ocean Pollution 2	
5	Jun 23	THIRD MIDTERM (Lectures 24-35)	

WEEK	DATE	LABORATORY EXERCISES
1	May 23-26	NO LAB
2	May 31	Lab 01: Marine Charts/Navigation/Bathymetry
2	Jun 1	Lab 02: Plate Tectonics
2	Jun 2	Lab 03: Surface Ocean Circulation
3	Jun 6	Lab 04: Nature of Seawater
3	Jun 7	Lab 05: Thermohaline Circulation
3	Jun 8	Lab 06: Marine Sediments/Movement
4	Jun 13	Lab 07: Near Shore Processes
4	Jun 14	Lab 08: Primary Biologic Productivity
4	Jun 15	Lab 09: Food Webs/Bioaccumulation
5	Jun 20	Lab 10: Ocean Acidification

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” <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. <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. <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. <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: <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. <https://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. <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. <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. <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. <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, <http://emergency.usc.edu>

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

Provides overall safety to USC community. <http://dps.usc.edu>