GEOL 107 Oceanography

4 units
Spring 2019,
MWF 10-10:50 AM
Location: Salvatori (SAL) 101

Instructor: Professor Steven P. Lund
Office: Zumberge Hall of Science (ZHS) 273
Office Hours: MWF 9-9:50 AM or by appointment
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Hours of Service: 10-4
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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 surface 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 human activities that use ocean resources. The laboratory component employs a hands-on approach to illustrate the methods which oceanographers use to develop an understanding of how the world's oceans work. Videotapes will be shown in lectures to better illustrate dynamic ocean processes.

Who should take this course?

This is a General Education course suitable for all undergraduate USC students.

Recommended Preparation

No other USC courses are required to take this course. The necessary background is simply a standard high-school education. Any introductory earth science, biology, chemistry, or mathematics course would be useful.

Learning Objectives and Outcomes

1: lectures will provide fundamental principles of solid-earth, ocean, atmospheric , and biologic processes.
2: students wil develop an understanding of the earth through the study of complex geosystems that interact across a wide range of spatial and temporal scales.
3: laboratories will provide hands-on experiences at learning how scientists actually do science. Students will observe earth mateterials and make quantitative measurements of natural elements of the oceanic world.
4: students will use online simulations/animations to visualize dynamic aspects of overall earth processes and predict their behavior.
5:students will learn how to critically evaluate scientific information in visual and written forms.
6: students will demonstrate the ability to acquaire and communicate scientific data, ideas, and interpretations in written and oral forms.
7: students will demonstrate proficiency in the visual display of quantitative information and associated plotting software.
8: students will learn how interactions within and between geosystems give rise to emergent behavior.
9: students will produce written and oral reports on ocean ecosystems. Each report will clearly and accurately present background, data, and interpretations.

Learning will be achieved via guided lecture- and laboratory-based instruction/discussion inside the classroom. The digital mastering (DM) component of the class will provide independent web-based experiences outside the classroom. Learning will be assessed via a variery of short quizzes, tests, written reports, and oral presentations.

Prerequisite(s): none

Co-Requisite(s): none

Concurrent Enrollment: none

Recommended Preparation: any introductory biology, chemistry or mathematics course

Course Notes

The course is a standard letter grade course. It has both a lecture and laboratory component. All notes and syllabus will be available on Blackboard. One portion of the course is web-based, Digital Mastering (DM), and can be done independently at the student’s pace.

Final Term Paper

Regional Ecosystem Assessments (REA)

Each student will write one short term paper, which is due on Monday (April 22) of the last week of class. It will count for 5% of the total class grade. The paper will be a regional ecosystem assessment (REA) for some specified location in the Earth's oceans. Each term paper will have at least 4 pages of text (double-spaced), at least 3 extra pages of relevant figures, and a list of references (standard references and web-based resources). (All term papers need to be in electronic format, .doc or pdf, and emailed to slund@usc.edu on Monday April 22). Each student will make one 5-minute Powerpoint presentation on the REA during the last laboratory period for the course. Lab points will be given for the quality of the presentation.

The REA will summarize the current environmental conditions, as discussed in this course, at each location and the primary organisms that live there. Key questions to answer are: 1) what are the most important environmental factors that control the ecosystem, 2) what aspects of the environment are variable (and on what time scales), 3) what are the most distinctive species in the ecosystem, 4) are there keystone species, 5) is there evidence for population variability beyond a seasonal scale? Two additional questions to consider are 1) how might the ecosystem change in the next 100 years with global warming and 2) are humans playing an important role in ecosystem stability now or in the future?

Each person will be given at set of geographic coordinates for each REA. Consider this 'location' to be at the center of the ecosystem under consideration, but the actual ecosystem might extend significantly beyond that location. I will try to focus on places that are 'special' in the sense that they have been previously studied more than the average random location on Earth. They may be regions where human activity is located or where humans significantly interact with their environment (coastal fisheries, for example); they may also be 'National Parks' for various countries. The point of preferentially using such REAs is that more has been published on these ecosystems. Inevitably, some people will get locations for which almost nothing is known. In such cases, use your general understanding gained from this class and reading to provide as much baseline-understanding for the REA as is possible.

Optional: JEP Service learning

Extra credit for the course is available by participating in the Joint Education Project (JEP). JEP places students in local area K-12 classrooms to enrich their education. Students work 1 hr per week for 8 weeks (with 1 hr per week preparation). The presentations will be on material you are learning in Oceanography. This experience will provide 5% extra credit for the course.

Technological Proficiency and Hardware/Software Required

The Digital Mastering (DM) component of the class will require students to log into a web-based network individually to complete selected exercises at the student's pace.

Required Readings and Supplementary Materials

The class text is Essentials of Oceanography, Trujillo and Thurman, 12th ed., Pearson Publ. You are required to purchase the 'Modified Mastering Oceanography' electronic supplement. Students can buy an electronic copy of the text (etext, good for 18 months) plus access to the Modified Mastering Oceanography component (a class requirement) at www.pearson.com/mastering. The cost is $78.95. Students can also buy the Modified Mastering Oceanography component alone (no etext) for $45.95. You should be able to buy a hard-copy of the text at the same website. The course id is lund01649.

Grading Breakdown

Including the above detailed assignments, how will students be graded overall? Participation should be no more than 15%, unless justified for a higher amount. All must total 100%.

Assignment	Points	% of Grade
3 lecture exams		50
Laboratory exercises		25
Digital Mastering		10
Regional Ecosystem Assessment		5
Attendance		10
TOTAL		100

Grading Scale

Lecture test grades, lab grades, and Final course grades will be curved. The expectation is to give ~1/3 As, ~1/3 Bs, and ~1/3 Cs. All passing grades must be better than 50% of the total points.

Course Schedule: A Weekly Breakdown

	Topics/Daily Activities	Readings and Homework	Deliverable / Due Dates
Week 1 Jan 7-11	0: Introduction 1: History of Oceanography 2: Origin and Structure of the Earth	Text Chapter 1	
Week 2 Jan 14-18	3: The Earth's Ocean Basins 4: Plate Tectonics - Historical Foundations 5: Plate Tectonics - Current Views	Text Chapters 2, 3	
Week 3 Jan 21-25	HOLIDAY 6: The Earth's Atmosphere and Global Heat Budget 7: Atmosphere Circulation/Circulation of Fluids	Text Chapter 6	
Week 4 Jan 28-Feb 1	8: Ocean Waves and the Tides 9: The 2004 Indian Ocean and 2010 Japan Tsunamis 10: Surface Ocean Circulation - Driving Forces	Text Chapters 8, 9	
Week 5 Feb 4- 8	11: Surface Ocean Circulation - Patterns around the world **FIRST MIDTERM EXAM (Lectures 1-11)** 12: The Nature and Properties of Sea Water	Text Chapters 5, 7	
Week 6 Feb 11-15	13: The Variability of Water in the World's Oceans 14: Deep Ocean Circulation 15: Weathering and Erosion	Text Chapters 4, 5, 7, 10	
Week 7 Feb 18-22	HOLIDAY 16: Marine Sedimentation 17: Coastal Environments (photic zone and coastal margin)	Text Chapters 4, 10, 11	
Week 8 Feb 25-Mar 1	18: Beach Processes and Human Impact 19: Nutrients/Dissolved Gasses and Biogeochemical Cycling 20: Systematics of Marine Biology	Text Chapters 10, 11, 12, 13	
Week 9 Mar 4-8	21: Ecosystems and Biodiversity 21: Ecosystems and Biodiversity 23: Pelagic Marine Ecosystems	Text Chapters 12, 13, 14	
Week 10	24: Deep Ocean Benthic Ecosystems	Text Chapter 15	

Mar 18-22	**SECOND MIDTERM EXAM (Lectures 12-23)** 25: Coastal Marine Environments		
Week 11 Mar 25-29	Movie – Sea of Cortez 26: Coral Reef Environments Movie – Coral Reefs		
Week 12 Apr 1-5	27: Marine Ecosystem Assessment: California Margin 28: Perspectives on Global Climate Change 29: Paleoceanography – The Cretaceous Greenhouse World	Text Chapter 16	
Week 13 Apr 8-12	30: Paleoceanography - The Quaternary Icehouse World 31: Today's World - ENSO Variability 32: Today's World - Global Warming	Text Chapter 16	
Week 14 Apr 15-19	33: Managing the Oceans – Physical Resources 34: Managing the Oceans - Ocean Fisheries 35: Managing the Oceans – Sources of Pollution	Text Chapters 11, 13	
Week 15 Apr 22-26	36: Managing the Oceans – The California Standard REVIEW **Option for Third Midterm Exam (Lectures 24-36)**		
FINAL May 6, 8-10:00 AM	**Option for Third Midterm Exam (Lectures 24-36)**		Date: For the date and time of the final for this class, consult the USC *Schedule of Classes* at classes.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. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific-misconduct.

Support Systems:

Student Health Counseling Services - (213) 740-7711 – 24/7 on call
engemannshc.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
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) 740-4900 – 24/7 on call
engemannshc.usc.edu/rsvp
Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) | Title IX - (213) 740-5086
equity.usc.edu, titleix.usc.edu
Information about how to get help or help a survivor of harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants. The university prohibits discrimination or harassment based on the following protected characteristics: race, color, national origin, ancestry, religion, sex, gender, gender identity, gender expression, sexual orientation, age, physical disability, medical condition, mental disability, marital status, pregnancy, veteran status, genetic information, and any other characteristic which may be specified in applicable laws and governmental regulations.

Bias Assessment Response and Support - (213) 740-2421
studentaffairs.usc.edu/bias-assessment-response-support
Avenue to report incidents of bias, hate crimes, and microaggressions for appropriate investigation and response.

The Office of Disability Services and Programs - (213) 740-0776
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 Support and Advocacy - (213) 821-4710
studentaffairs.usc.edu/ssa
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
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, 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