

INTRODUCTION TO OCEANOGRAPHY

OCEANOGRAPHY 201

FALL, 2009

An introductory course to oceanography covering the dimensions of the science of oceanography, the physical and chemical properties of sea water, waves, tides, currents, life in the ocean, and the geologic structure of the ocean floor, environmental concerns, and human use of the oceans.

3 credit hours; no prerequisites; no recommended special preparation; basic reading skills required; partially satisfies natural science requirement for Assoc. in Arts degree in the community college and for the Bach. of Arts degree at the university; no laboratory or field trip required for this course, but concurrent participation on oceanography field trips or field-trip courses or in the Marine Option Program is highly recommended — see below.

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* a message is recorded here, changed weekly, concerning field trips, assignments, etc.

Consultation hours:

Mon. & Wed., 1100-1230, Th.: 1630-1730.

Other times by appointment.

(best to look for me first in the laboratory [room 117A], then in my office.)

Textbook:

Required: Garrison; *Essentials of Oceanography*, any edition, Thomson

Recommended: Butt, Russell and Grigg; *Surf Science*, U. Hawaii Press

Activities outside of class:

A website of the week will be announced during the semester from which questions on quizzes or examinations will be based. Extra credit may be obtained via documented attendance at Marine Option Program (MOP) talks on any UH campus, by visiting either of the UH oceanographic ships, attending lectures/seminars in the Departments of Oceanography/Geology & Geophysics/Zoology at UH Manoa, or attending the annual SOEST Open House (Oct. 16 & 17).

Ancillary Activities:

- Numerous seminars, talks, symposia and exhibits occur throughout the university system and at various museums, you are particularly encouraged and welcomed to these. Whenever possible, these will be announced in class.
- The Marine Option Program (MOP) is a certificate program at most campuses of the university that encourages direct participation in the science, sociology, art, management, engineering and literature of the oceans. MOP participation is essential to a career in oceanography within Hawaii. MOP is an especially viable and active program at WCC; as a university-wide program, you may easily transfer MOP credits, projects, contacts and friendships to any campus following graduation from WCC. Announcements concerning MOP events and programs are made in class and/or posted on bulletin boards in the MOP office, Hale 'Imiloa, room 118.
- Supplementary, non-required reading is in the library, both on reserve and on open shelves; these include magazines and books; you are encouraged to peruse this literature.
- The Aerospace Laboratory in Hale 'Imiloa, room 135, contains wonderful exhibits and images of the oceans from space.

"The sea lies all about us... the continents themselves dissolve and pass to the sea, in grain after grain of eroded land... for all at last returns to the sea - to Oceanus, the ocean river..."

Rachel Carson, American author, "Silent Spring", 1962

"Water, water everywhere... ."
Samuel Coleridge, American poet

Mode of Instruction: Lectures that expand upon, and update, the information presented in the textbook; a special emphasis is placed upon descriptions of current research concepts and new information from this research; movies and videos compliment lectures.

Course Objective: An emphasis on geological, physical, nearshore and environmental oceanography, in addition to politics/law of the sea - biological oceanography, marine technology/engineering, and the history of oceanography, are interwoven throughout the course (Zoo 200, Marine Biology, emphasizes biological oceanography). The emphasis in OCN 201 is to provide an appreciation of: (1) the physical construction and impermanence of ocean basins on the earth's surface; (2) the global, grand recycling-mechanism provided by plate tectonics; (3) the characteristics, internal changes, stirring and movement of seawater; (4) the oceans' influence in determining climate; (5) management of the oceans by man, and (6) anthropogenic impacts — past, present and predicted — on the oceans .

Type of examination: written; questions require essays of varying length from short (single sentence) to longer (no more than 10 minutes) answers; some questions may involve plotting information on maps.

Examination/Grading schedule:

short essays/papers: based upon the website of the week

One midterm: 1 hour, covering all material discussed up to the examination date; if this examination is not taken on the scheduled date, a make-up exam. can be given (this will be a different and more difficult, exam.).

Final exam: 2 hours, concerned with the entire course, with some emphasis on the last third of the course; must be taken on scheduled date.

Extra/special credit: awarded for visits to oceanographic ships in port, for attendance at symposia, exhibitions and talks at WCC, UH-Manoa, Bishop Museum, etc., as well as for participation in various Marine Option Program events - before doing any of these, please check with Dr. McCoy.

Grading scheme: numerical grades calculated from an average of all test scores, with the midterm = 35%, the final = 45%, and short essays = 20% of the total grade; total possible numerical grade = 100; letter grades assigned with:

A = 90 - 100

B = 80 - 89

C = 70 - 79

D = 60 - 69

F = < 60

CR/NC = credit/no credit

N = course not completed due to unforeseen difficulties; this grade assigned rarely

I = incomplete due to unusual circumstances and assigned only with permission of the instructor; no credit given until this grade is changed to an A-D letter grade - it is your responsibility to make this change.

Field Trips: Not required but highly recommended:

Marine Option Program: various field trips, visits, and participation in marine activities at oceanographic laboratories and facilities throughout Hawaii; watch bulletin boards and the newspaper for announcements; no credit, no registration required; the Marine Option Program is a certificate program of the University of Hawaii with an active program at WCC; offices are in Hale 'Imiloa, room 118.

"So many questions, so many mysteries. It is only by going down ourselves to the depths of the sea that we can hope to clear them up."

Auguste Piccard, French explorer

"Grey-eyed Athena sent them a favorable breeze, a fresh west wind, singing over the wine-dark sea."

Homer, Greek bard of the Archaic Period

Schedule of lectures and corresponding chapters in the textbook:

<u>WEEK</u>	<u>SUBJECT</u>	<u>CHAPTER</u>
1	Introduction, metric (SI) system; Marine Option Program, latitude & longitude, map projections; geography of the oceans	2, Appendices I, III, & IV
----- G e o l o g i c a l O c e a n o g r a p h y -----		
2	Geography & bathymetry of the seafloor Continental margins	4 4
3	Mapping the seafloor Structure of the earth	2 3
4	Plate tectonics	3
5	Underwater volcanism & hydrothermal vents: geology/biology/chemistry Geologic time - origin of the earth, oceans, atmosphere & life Paleo-oceanography and sea-level changes	4, 12, 14 1, 12, Appendix II 5, 11, Appendix II
6	Marine sediments and fossils, marine stratigraphy, marine habitats Seafloor sedimentary & biologic processes Sampling methods	5, 13, 14 5 2, 5
----- C h e m i c a l O c e a n o g r a p h y -----		
7	Chemical & physical properties of water	6
8	Heat budget of the earth & oceans Climate & atmospheric circulation	7 7
----- P h y s i c a l O c e a n o g r a p h y -----		
9	Review Midterm Examination	1-7, 11-14, appendices I-IV
10	Temperature, salinity & density distribution at the surface Horizontal circulation: Coriolis force; Ekman transport Horizontal circulation: geostrophic transport Ocean-surface circulation patterns, estuarine and lagoonal circulation	6 7, 8 8 8
11	Temperature, salinity & density distribution at depth Light, ecosystems & acoustics at depth Vertical & thermohaline circulation Oceanic circulation patterns, El Nino/La Nina, Pacific Decadal Oscillation/Atlantic Decadal Oscillation	6 6 6 7, 8
12	Shallow and deep-water waves, wind waves Internal waves, tsunamis, storm surges, seiche	9 9
13	Tides and the tidal wave	10

"I never saw the use of the sea. Many a sad heart it has caused, and many a sick stomach... the boldest sailor climbs on board with a heavy soul and leaps on land with a light spirit."

Benjamin Disraeli, "Vivian Grey", 1837

"All the rivers run into the sea, yet the sea is not filled."
Ecclesiastes 1, 7 (about 200 BC/BCE)

----- N e a r s h o r e O c e a n o g r a p h y -----		
14	Nearshore (littoral) oceanographic processes	11
14	Beaches and coastlines	11
----- E n v i r o n m e n t a l / P o l i t i c a l O c e a n o g r a p h y -----		
15	Politics/management of the coastal zone; Coastal Zone Management (CZM)	11
15	CO ₂ cycle, greenhouse gasses, global climate change	6, 15
	Marine pollution; International Convention for the Prevention of Pollution from Ships (MARPOL Protocol)	15
	Law of the Sea (LOS)	Appendix V

N.B.: The history of oceanography, marine biology, as well as the techniques, equipment and methods used in doing oceanographic work, are imbedded within every lecture rather than isolated into a separate series of lectures.

***"I must go down to the sea again,
for the running tide
Is a wild call and a clear call that
cannot be denied..."***
Annon., ballad