

## OCN 201 – Science of the Sea

CRN 62149 - 03 Credits

<b>INSTRUCTOR:</b>	David A. Krupp, Ph.D.
<b>OFFICE:</b>	Hale 'Imiloa 121A
<b>OFFICE HOURS:</b>	R 9:00 - 10:00 AM (in person) R 7:00 – 8:00 PM (online)
<b>TELEPHONE:</b>	(808)-236-9121
<b>EMAIL:</b>	krupp@hawaii.edu
<b>EFFECTIVE DATE:</b>	Spring 2018

### WINDWARD COMMUNITY COLLEGE MISSION STATEMENT

*'O keia ka wā kūpono e ho'onui ai ka 'ike me ka ho'omaopopo i kō Hawai'i mau ho'oilina waiwai. Aia nō ho'i ma ke Kulanui Kaiāulu o ke Ko'olau nā papahana hou o nā 'ike 'akeakamai a me nā hana no'eau. Me ke kuleana ko'iko'i e ho'ohiki ke Kulanui e kāko'o a e ho'okumu i ala e hiki kē kōkua i ka ho'onui 'ike a nā kānaka maoli. Na mākou nō e ho'olako, kāko'o a paipai i nā Ko'olau a kō O'ahu a'e me nā hana no'eau ākea, ka ho'ona'auao 'oihana a me ka ho'onui 'ike ma ke kaiāulu — hō'a'ano a e ho'oulu i nā haumāna i ka po'okela.*

*Windward Community College offers innovative programs in the arts and sciences and opportunities to gain knowledge and understanding of Hawai'i and its unique heritage. With a special commitment to support the access and educational needs of Native Hawaiians, we provide O'ahu's Ko'olau region and beyond with liberal arts, career and lifelong learning in a supportive and challenging environment — inspiring students to excellence*

### CATALOG DESCRIPTION

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 hours lecture) WCC DP

### PREREQUISITES

No prerequisites nor co-requisites. The student is recommended to take the companion laboratory course OCN 201L concurrently with OCN 201 when it is available.

### STUDENT LEARNING OUTCOMES

*The student learning outcomes are*

- Understand how the scientific method works, how it has been applied in Earth science, and how it differs from other ways of acquiring knowledge.
- Articulate how the Earth is an integrative system across many scientific disciplines.
- Understand the internal structure of the Earth and the dynamic processes of plate tectonics that shape its surface, including sea floor spreading, subduction, and continental drift.
- Understand the causes of rising sea level and its impacts on coastal areas, including erosion and beach loss.

- Identify the major pathways of chemicals to the oceans and the effect that biological processes have on redistributing and removing chemicals from the oceans.
- Describe the major processes that cause the deep and shallow circulation of water in the oceans.
- Identify the major marine habitats, the types of organisms that live in those habitats, and give examples of how organisms are adapted to their habitat.
- Describe the types of interactions that occur among organisms in the marine food web and between organisms and their environment.

## REQUIREMENTS SATISFIED BY THIS CLASS

- This class may satisfy the Windward Community College Associate in Arts Degree diversification requirement for a Natural Sciences physical science class (DP).
- This class may partially satisfy requirements for the Windward Community College Academic Subject Certificate in Bio-Resources and Technology, Bio-Resources Development and Management Track (Elective Set II: Environment and Ecology).
- This class may partially satisfy requirements for the University of Hawai'i Marine Option Program Certificate as a marine survey course.

## COURSE CONTENT

### *Course Content and Topics*

- Science as a way of knowing
- Latitude and longitude
- Map projections
- Geography and physiography of the sea floor and continental margins
- Mapping the sea floor
- Plate tectonics
- Hydrothermal vents and ecosystems
- Origin of the oceans and sea water
- Marine sediments and sampling technology
- Chemical and physical properties of sea water
- Heat budget and circulation of the atmosphere and oceans
- Temperature, salinity and density of sea water at the surface and at depth; biological zonation
- Horizontal circulation and patterns, Coriolis effect, Eckman transport, La Nina and El Nino conditions, PDO, NAO changes
- Vertical thermohaline circulation, upwelling and downwelling, biological productivity
- Lagoonal and estuarine circulation
- Waves – wind, tsunamis, rogue, internal, seiche, storm surges
- Tides and the tidal wave
- Nearshore processes
- Beaches, sand budgets, and coastlines
- Greenhouse gasses and global climate change
- Classification of living things
- Marine life habitats and life styles

- Marine, food chains & webs and biological productivity
- Biogeochemical cycles
- Law of the Sea

## **COURSE TASKS, ASSESSMENT AND GRADING**

**ENGAGEMENT ESSAYS.** The student will complete one essay that deals with a capacious topic relevant to oceanography as defined by the posted assignments. The essay will present a thoughtful, objective, well-reasoned, organized and documented (*using formal citation procedures – APA format*) point of view regarding the topic. There will be a total of two such essays assigned throughout the semester. The essay will be worth 30 points. The essay must be double-spaced typed using a 12-point standard font such as Times, Arial, or Geneva with one inch margins all the way around. An assessment rubric will provide the student with guidance about how to approach the essay topic. The assignment must be submitted by the assignment deadline. *An assignment received after this deadline (but before one week after the deadline) will receive an automatic deduction of five points. A late assignment received one week or more after the deadline will not be accepted and the student will receive a score of 0 for that assignment.*

**PARTICIPATION IN ONLINE DISCUSSIONS.** The student will actively engage in two online discussions during the semester (10 points for each discussion; 20 points total). These discussions, which are meant to entice interest in Oceanography, will involve posting thoughtful comments, including responses to comments, to a discussion topic posted on the Class Discussion page on the class Laulima site. *Each discussion topic will be open for limited periods of time (typically 2-3 weeks) and students will only be able to comment/respond during these open periods.* Rubrics for scoring student participation in these discussions will be described on the class Laulima site.

**QUIZZES.** The student will take a minimum of ten quizzes (15 points each; 150 points total) administered through the Internet (Laulima) during specified time periods. These quizzes will address the detailed content and major concepts presented in the lectures, lecture outlines, text readings, and study guide activities. If the student takes more than ten quizzes, only the best ten quiz scores will be used in calculating the student's total points. Since these quizzes may be taken using home computers connected to the Internet, students may refer to instructional resources (text, study guide, lecture notes, etc.) while taking the quizzes. However, each quiz will be timed, the student having only 20 minutes to complete. Because the student will be able to drop several of the lowest quiz scores, *no make-up quizzes for missed quizzes will be administered for any reason including computer/Internet crashes, illnesses, and emergencies (the student will receive no score for missed quizzes).*

**EXAMINATIONS.** The student will take one midterm examination (100 points) and a non-cumulative final examination (100 points) to demonstrate understanding of information presented primarily during lectures. Exams will be delivered through the Internet via Laulima at the student's respective learning resource center. These proctored exams will be closed-book exams and students will not be allowed to refer to texts, notes, nor other materials while taking the exam. ***NO RETESTS will be given.*** The student must take the exam during the scheduled time period. A student missing an exam because of an illness or legitimate emergency may take a make-up exam as soon as possible after the student returns from the illness and as determined by the instructor. In such a circumstance, the student should make every reasonable attempt to contact the instructor before the exam period is over (or as soon as possible). While make-up exams will cover the same content area as a missed exam, the exam format and specific questions may be different.

*The assignment of points will be according to the following protocol:*

Engagement Essay	30	points
Online Discussions	20	points
Quizzes	150	points
Midterm Examination	100	points
<u>Final Examination</u>	<u>100</u>	<u>points</u>
TOTAL	400	points

*Letter grades will be assigned as follows:*

<b>A</b>	90% or above in total points.
<b>B</b>	80-89.9% of total points.
<b>C</b>	65-79.9% of total points.
<b>D</b>	55-64.9% of total points.
<b>F</b>	Below 55% of total points or informal or incomplete official withdrawal from course.
<b>I</b>	Incomplete; given at the <b>INSTRUCTOR'S OPTION</b> when student is unable to complete a small part of the course because of circumstances beyond his or her control. It is the <b>STUDENT'S</b> responsibility to make up incomplete work. Failure to satisfactorily make up incomplete work within the appropriate time period will result in a grade change for "I" to the contingency grade identified by the instructor (see catalog).
<b>CR</b>	65% or above in total points; the student must indicate the intent to take the course as <b>CR/NC</b> in writing by the end of the 10th week of classes (see catalog).
<b>NC</b>	Below 65% of total points; this grade only available under the <b>CR/NC</b> option (see above and see catalog).
<b>N</b>	<b>NOT GIVEN EXCEPT UNDER EXTREMELY RARE CIRCUMSTANCES</b> (e.g., documented serious illness or emergency that prevents the student from officially withdrawing from the course); never used as an alternative for an "F" grade.
<b>W</b>	Official withdrawal from the course after the third week and prior to the end of the 10th week of classes (see catalog).

Waiver of minimum requirements for specific grades may be given only in unique situations at the instructor's discretion.

Students involved in academic dishonesty will receive an "F" grade for the course. Academic dishonesty is defined in WCC's college catalog.

## LEARNING RESOURCES

Required Textbook: Segar, D.A., 2018. Introduction to Ocean Sciences. Fourth Edition (second electronic edition, version 4.0). This text is available as a free digital (PDF file) download from the class Laulima site.

Handouts and selected readings from various texts may also be distributed through the class Laulima site.

## TENTATIVE SCHEDULE OF LECTURE TOPICS

Week	Date Range	Topic	Text Chapter
1	8-Jan - 14-Jan	Course Introduction Science as a Way of Knowing	N/A
2	15-Jan - 21-Jan	The Ocean Planet History and Importance of Ocean Studies	Chapter 1 Chapter 2
3	22-Jan - 28-Jan	Studying the Oceans	Chapter 3
4	29-Jan - 4-Feb	Plate Tectonics: Evolution of the Ocean Floor	Chapter 4
5	5-Feb - 11-Feb	Water and Seawater	Chapter 5
6	12-Feb - 18-Feb	Ocean Sediments	Chapter 6
7	19-Feb - 25-Feb	Ocean-Atmosphere Interactions	Chapter 7
8	26-Feb - 4-Mar	Ocean Circulation	Chapter 9
9	5-Mar - 11-Mar	Waves	Chapter 9
10	12-Mar - 18-Mar	<b>Midterm Examination (covers weeks 1-8)</b> Tides	Chapter 10
11	19-Mar - 25-Mar	Coasts	Chapter 11
	26-Mar - 1-Apr	<b>SPRING RECESS</b>	
12	2-Apr - 8-Apr	Foundations of Life in the Oceans	Chapter 12
13	9-Apr - 15-Apr	Coastal Oceans and Estuaries	Chapter 13
14	16-Apr - 22-Apr	Marine Ecology	Chapter 14
15	23-Apr - 29-Apr	Ocean Ecosystems	Chapter 15
16	30-Apr - 6-May	Impacts of Humans on the Oceans	Chapter 16
17	7-May - 11-May	<b>Final Examination</b>	

## **STUDENT RESPONSIBILITIES**

The student is expected to attend and actively participate in all course lectures and activities, and complete all assignments, quizzes and examinations on time.

The student is expected to be prepared in advance before the class sessions. Being prepared includes the following: having read text materials (e.g., textbook readings and other resources) assigned for that day's activities and bringing required work materials (e.g., textbook, handouts, writing supplies, etc.) to the session.

Any changes in the course schedule, such as examination dates, deadlines, etc., will be announced ahead of time in class. It is the student's responsibility to be informed of these changes.

It is the student's responsibility to be informed about deadlines critical to making registration changes (e.g., last day of erase period and last day for making an official withdrawal).

Students should expect a level of difficulty comparable to other 200-level science classes intended for non-science majors. When difficult concepts and detailed information are presented, it is the student's responsibility to take the appropriate steps to learn and understand these concepts and information.

Science courses at W.C.C. generally require two to three hours of independent private study time for each hour in class. However, because of the nature of the material presented in ZOO 200, more study time may be required (depends upon the student's science/biology background). It is the student's responsibility to allocate the appropriate time needed for study in an environment conducive to quality study. The student must budget time efficiently and be realistic about all personal and professional commitments that consume time.

## **HOW TO SUCCEED IN THIS CLASS**

Understanding any science involves understanding many difficult concepts and vocabulary, not just knowing facts. The student should know that the details to these concepts are important. In addition, the student will be introduced to hundreds of new words. In some cases, words that are familiar in a context other than ocean science will be introduced in the context of oceanography. The student will need to understand and use these terms in an oceanographic context.

Students are expected to participate in all lecture activities and complete all course assignments on time.

The student will not succeed in this class without taking careful lecture notes and reading the corresponding material in the textbook. As soon as possible (best if done on the same day), the student should copy over these lecture notes filling in gaps and missing information by referring to the textbook and other resources provided. The student should carefully review these rewritten lecture notes as often as possible.

In addition to copying over lecture notes, study activities should include drawing labeled diagrams or graphs that illustrate important concepts (e.g., the profile of the ocean floor, temperature change with depth in the ocean, or the main features of a deep-water ocean surface wave). These diagrams need not be works of art, but should clearly illustrate significant information. Before an exam, it

would be useful to redraw these labeled diagrams and graphs from memory.

The student should make flashcards for each new vocabulary word presented (refer to textbook and study guides for lists of required terms). The student should use these card for self-testing as often as possible. The student should also practice using the words to explain oceanographic concepts.

The student should do all of the recommended study guide activities and review all of the Internet resource materials provided.

The textbook and other resources may include useful study questions. The student should write out answers to all of these questions as though they were required assignments. Students could exchange these answers and provide constructive feedback to each other.

The student should read the textbook materials corresponding to a particular lecture before and after that lecture.

Students are recommended to establish study groups and study together. The students in these groups may test each other's knowledge and understanding of the information. They may also take turns teaching each other.

The student should ask the instructor to explain the things that the student does not understand.

## **DISABILITIES ACCOMMODATION STATEMENT**

If you have a physical, sensory, health, cognitive, or mental health disability that could limit your ability to fully participate in this class, you are encouraged to contact the Disability Specialist Counselor to discuss reasonable accommodations that will help you succeed in this class. Ann Lemke can be reached at 235-7448, [lemke@hawaii.edu](mailto:lemke@hawaii.edu), or you may stop by Hale 'Akoakoa 213 for more information.