

I. CATALOG DESCRIPTION:

Division: Science & Math
Department: Oceanography
Course ID: OCEAN 100
Course Title: Introduction to Oceanography
Units: 4
Lecture: 3 hours
Laboratory: 3 hours
Prerequisite: None.

A. Catalog Description:

Geological processes that created the ocean basins, the type and character of oceans sediments; the chemistry of sea water; the physical motions of the oceans; waves, tides, and circulation; a survey of the variety of life in the oceans; and the interrelationships of biological communities with their physical environments. Laboratory activities and field trips are coordinated with the lecture topics.

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II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: One

III. EXPECTED OUTCOMES FOR STUDENTS:

LECTURE

Upon completion of the course, the student will be able to:

- A. describe the general internal structure of the earth,
- B. understand the reason for the ocean basins and contents,
- C. apply knowledge of ocean basin formation to analyze processes that continue to create new oceanic crust,
- D. identify the major chemical constituents of sea water,
- E. understand and apply the relationships among temperature, salinity and density in sea water,
- F. describe the geologic parameters expressed in the three types of plate boundaries,
- G. understand and apply the marine conditions controlling the distribution of life in the oceans,
- H. describe the tidal phenomena and relate them the motions of the Earth, Moon, and Sun,
- I. recognize taxonomic hierarchy and understand the value scientific nomenclature,
- J. identify and apply the physical parameters that limit biological expansion into other marine life zones.

LABORATORY

Upon completion of the course, the student will be able to:

- A. utilize charts and graphs to represent oceanographic data,
- B. identify and understand the origin and significance of the three fundamental rock types,
- C. find specific locations on Oceanographic Charts and identify common features using map symbols,
- D. take measurements from maps and determine the rate of geologic processes,
- E. identify the coastal landforms on maps and charts and understand their origin,
- F. list common life forms one expects to find in the various Marine Life Zones,
- G. understand the Taxonomic system of classifying biota, and
- H. make measurements using a variety of tools and use the data collected to generalize conclusions about the system being measured.

IV. CONTENT: LECTURE

- A. The Third Planet
 - 1. Metric system
 - 2. Universe, Galaxy and Solar system
 - 3. Origins
- B. The Dynamic Earth
 - 1. Plate Tectonics: A Unifying Theory
 - 2. Origin of the ocean basins
 - 3. Origin of continents
 - 4. Continental Margins
- C. The Oceans
 - 1. Chemical and Physical properties of water
 - 2. Salinity and Salinity distribution
 - 3. Trace elements, nutrients, and gases in solution
 - 4. Temperature and temperature distribution
 - 5. Temperature, salinity, and density
 - 6. Sound and Light in the sea
- D. Water in Motion
 - 1. Effect of the Oceans on Climate
 - 2. Coriolis effect on wind and the currents
 - 3. Surface Water Currents
 - 4. Winds, Waves, and Coastlines
 - 5. Coastal Breakers
 - 6. Tides and the tide generating potential
 - 7. Tidal dynamics
 - 8. Estuaries
- E. Living On Planet Earth
 - 1. A Brief History of Life on Earth
 - 2. Taxonomy
 - 3. Kingdoms Monera and Protista
 - 4. Kingdom Plantae - the Algae
 - 5. Kingdom Animalia - Porifera and Cnidaria
 - 6. Phylum Mollusca
 - 7. Phyla Arthropoda and Echinodermata
 - 8. Marine Chordates - the "fishes"
 - 9. Amphibians, Reptiles and Birds
 - 10. Marine Mammals - Order Cetacea
 - 11. Marine Mammals - Orders Pinnipedia, Sirenia and Carnivoria
 - 12. Marine Habitats and Life Zones

CONTENT: LABORATORY

- A. Bathymetry
- B. Marine charts and Navigation
- C. Sea-Floor spreading and Plate Tectonics
- D. Geography of the Marine environment
- E. Sediments and Materials of the Sea Floor
- F. Solar Radiation and Heat Balance
- G. Seawater Temperatures
- H. Salinity of Seawater
- I. Water Masses - Identified by Salinity/Temperature diagrams
- J. Surface Currents
- K. Tides
- L. Ocean Waves and Coastal Processes
- M. Distribution of Life in the Oceans
- N. Primary and Secondary Productivity
- O. Primary Nutrients
- P. Marine Food Chains and Food cycles
- Q. Plankton and Nekton
- R. Marine Life Zones

- S. Marine Adaptations and the Deep Sea Environment

V. METHODS OF INSTRUCTION:

- A. Lecture, including directed discussion, instructor-guided investigations, instructor-moderated problem solving sessions, and audio-visual aids-including computer-generated lecture outlines, supervised illustration of major features.
- B. Field trips in which students will be shown oceanographic features first hand, collect representative samples, perform field identifications, and assess the results of a variety of processes.
- C. Laboratory work, including instructor-guided demonstrations of oceanographic measurements and classification processes, student identification and classification of appropriate materials, interpretation of maps, and charts and interpretation of oceanographic data in graphical form.

VI. TYPICAL ASSIGNMENTS:

- A. Reading Assignments
 - 1. Selected assignments from the textbook and laboratory manual.
 - 2. Articles covering current events in geology and oceanography (landslides, earthquakes, volcanic eruptions, and storms) as well as long-term events (for example, natural resource depletion, environmental effects of fishing, mining and processing ores).
- B. Writing Assignments
 - 1. Selected chapter exercises from the textbook.
 - 2. Instructor-prepared exercises, especially those involving illustrations (maps, charts, diagrams, cross-sections) and their analysis.
 - 3. Laboratory reports including observations, drawings, conclusions, and answers to related questions.
 - 4. A written term project, either a research paper or a group project, showing synthesis of the concepts and processes covered in the course.
- C. Example
Choose one of the magazine or newspaper articles on the reading list and analyze the following:
 - 1. Scientific accuracy
 - 2. Topic of study in this course
 - 3. What was reinforced as learned in this course
 - 4. What was new information for you
 - 5. Prepare a written summary and 3-5 minute class presentation.

VII. EVALUATION:

- A. Methods of evaluation:
 - 1. Written quizzes and/or tests of a variety of types of questions from among true-false, multiple choice, fill-in, sentence completion, and short essay.
 - 2. Written exercises.
 - 3. Written summaries of magazine or newspaper articles.
 - 4. Laboratory assignments.
 - 5. Performance in the field, including the journal.
 - 6. Performance on the term project.
- B. Frequency of evaluation:
 - 1. Quizzes are given in lecture and/or lab, at weekly or monthly intervals.
 - 2. Exams are given on a monthly basis, including a comprehensive final exam.
 - 3. Exercises are assigned on a frequency to support comprehension of material, as deemed appropriate by the instructor.
 - 4. Laboratory assignments are given weekly.
 - 5. Typically, the class will take two field trips each semester.

- C. Typical exam questions
1. List the four major subdivisions of the earth's interior.
 2. In the list below, identify the animals that are included in the Order Cetacea:
 - a. Porpoise
 - b. Whale Shark
 - c. Elephant Seal
 - d. Polar Bear
 - e. Penguin
 3. On the diagram provided, identify the marine life zones indicated by the arrows.
 4. Describe the conditions on the earth that causes the "Trade Winds".
 5. Why is it significant that the freezing temperature of seawater is above its temperature of maximum density?
 6. Describe the activity of Plate Tectonics that prevents Oceanic Crust from being as old as Continental Crust.

VIII. TYPICAL TEXTS:

Ingmanson and Wallace, *Oceanography*, 5th ed., Wadsworth Publishing Co., 1995.
Garrison, Tom, *Oceanography*, 3rd ed., Wadsworth Publishing Co., 1999.
Pinet, Paul R., *Invitation to Oceanography*, 2nd ed., Jones and Bartlett Publishers, 2000.

TYPICAL LABORATORY MANUALS:

Pipkin, et. al. , *Laboratory Exercises in Oceanography*, 3rd ed., WH Freeman and Co., 2001.

IX. OTHER SUPPLIES REQUIRED OF STUDENTS:

NONE