ESCI 0015L - INTRODUCTION TO OCEANOGRAPHY LABORATORY

Catalog Description

Prerequisite: Completion of or concurrent enrollment in ESCI 15
Hours: 54 laboratory
Description: Exploration of the ocean environment, including physical, chemical and biological aspects. Learning through investigation and systematic laboratory procedures. (CSU, UC)

Course Student Learning Outcomes

- CSLO #1: Characterize ocean basin morphology in terms of bathymetric maps and profiles and analyze features in the context of plate tectonics.
- CSLO #2: Analyze modern and past marine sediment type and distribution.
- CSLO #3: Characterize ocean water properties (salinity, temperature, density) and relate them to each other and to oceanic processes such as upwelling.
- CSLO #4: Analyze water surface movement (waves, tides, currents) and its interaction with the coastline.
- CSLO #5: Describe the distribution and characteristics of life in the ocean.

Effective Term

Fall 2018

Course Type

Credit - Degree-applicable

Contact Hours

54

Outside of Class Hours

0

Total Student Learning Hours

54

Course Objectives

1. Construct two-dimensional representations of the seafloor using isobaths based on soundings
2. analyze bathymetry on a map to identify and describe seafloor features
3. relate seafloor features to plate tectonic setting
4. compare and contrast stress types acting at plate boundaries
5. calculate plate movement rate
6. create bathymetric cross-sections (profiles) with and without vertical exaggeration
7. calculate vertical exaggeration from given profiles
8. compare and contrast the three main oceans in terms of size, average depth, latitudinal extent, and abundance of seafloor features (such as trenches) as they relate to Plate Tectonics
9. analyze the distribution of marine sediments in any given basin
10. relate marine sediment type to origin
11. classify marine sediments based on the relative abundance of their components
12. plot marine sediment components versus depth from core sample data
13. analyze plots of marine sediment components versus depth to determine depositional history in a given basin
14. calculate marine sedimentation rates from core samples
15. calculate water depth and thickness of sedimentary units from seismic profiles
16. explain the distribution of surface salinity in the world ocean based on maps and plots
17. plot water parameters with depth
18. contour water temperature data in a cross-sectional view of a basin
19. analyze isotherms to identify oceanographic processes such as upwelling
20. calculate seawater density based on salinity and temperature values
21. identify layered water masses in a cross-sectional view of an ocean basin
22. relate surface ocean currents to atmospheric movement
23. analyze tide records for different tide types
24. estimate minimum wind speeds and fetch required to set up a fully developed sea
25. determine wave height given fetch and speed
26. determine direction of longshore current from map views of coastlines
27. evaluate the effect of piers and breakwaters on natural erosion and depositional processes at a coastline
28. analyze a coastline to determine the safest bathing beach area(s)
29. plot hurricane paths and relate them to the atmospheric conditions present
30. compare and contrast hurricane sustained wind speed with atmospheric pressure
31. classify marine life based on the Hedgepeth zonal scheme
32. interpret plots of primary productivity, dissolved oxygen, dissolved nutrients, and respiration with depth, identifying the critical depth
33. calculate gross primary productivity from bottle samples at regular-interval depths
34. analyze sea surface buoy data to determine normal, El Nino, or la Nina conditions
35. establish trophic relationships within an ecosystem
36. predict changes in populations of an ecosystem with the introduction of a new component (e.g. a predator)
37. calculate salinity variations in estuaries due to tides
38. evaluate microfossil assemblages in core samples to determine age and paleoenvironment
39. correlate cores based on their microfossil assemblages
40. calculate sea surface temperatures based on microfossil morphology

General Education Information

- Approved College Associate Degree GE Applicability
  - AA/AS - Physical Sciences
  - AS - Physical Science Lab
- CSU GE Applicability (Recommended-requires CSU approval)
  - CSUGE - B3 Lab Activity
- Cal-GETC Applicability (Recommended - Requires External Approval)
- IGETC Applicability (Recommended-requires CSU/UC approval)
  - IGETC - 5C Laboratory Science

Articulation Information

- CSU Transferable
- UC Transferable

Methods of Evaluation

- Problem Solving Examinations
  - Example: Classify a marine sediment that has the following components: 30% silt, 10% clay, 60% calcareous ooze.
- Skill Demonstrations
  - Example: Plot the track of a hurricane given latitudinal and longitudinal data; use the plot to calculate hurricane forward speed on any given 24-hour period.

Repeatable

No

Methods of Instruction

- Laboratory
- Distance Learning

Lab:

1. Instructor facilitates construction of temperature vs. depth plots by showing a visual example and then checking as groups work collaboratively in constructing a similar plot in the lab handout.
2. Instructor lectures briefly on the effect of human interference of beach drift and facilitates the analysis of case studies on the California coastline where groups of students work on the lab handout to evaluate each situation and describe in writing the known effects of particular man-made structures such as piers on beach growth or erosion.

Typical Out of Class Assignments
Reading Assignments

1. Read handout on marine sediments and apply information on classification. 2. Read handout on plate tectonics and work on boundary exercises.

Writing, Problem Solving or Performance

1. Classify marine sediments based on the Ocean Drilling Project scheme.
2. Identify sedimentary layering from seismic profiles.

Other (Term projects, research papers, portfolios, etc.)
Required Materials

- The Ocean Environment Lab Manual
  - Author: Benitez and Hardee
  - Publisher: Kendall Hunt
  - Publication Date: 2014
  - Text Edition: 3rd
  - Classic Textbook?:
  - OER Link:
  - OER:

Other materials and-or supplies required of students that contribute to the cost of the course.