

OCE 3014 L
Survey of Oceanography Laboratory

Course Description: A laboratory course to accompany OCE 3014

Pre-requisites: GLY 1010, upper level standing

Co-Requisites: OCE 3014

Credits: 1

Course Competencies

Competency I: The student will demonstrate a knowledge of Bathymetry – the shape of the sea floor.

The student will be able to:

- a. Visualize a three dimensional sea floor surface from a two dimensional construct
- b. Manipulate the mechanics and rules of contouring charts from an array of individual sea floor depth measurements
- c. Create construction topographic profiles to reveal the shape of the sea floor or specific sea floor features.

Competency II: The student will demonstrate an understanding of marine charts.

The student will be able to:

- a. Understand the coordinate system (latitude and longitude) of the earth's sphere
- b. Become familiar with the multitude of data that are found on marine charts
- c. Plot a pre-determined course on a chart and to navigate using directions and landmarks.

Competency 3: The student will demonstrate an understanding of sea floor spreading and plate tectonics.

The student will be able to:

- a. Describe the distribution of the earth's major physiographic features including volcanoes, ocean trenches, and mid-ocean ridges
- b. Recognize the scientific importance of plate boundaries and the geophysical activities taking place there
- c. Investigate the slow rates at which plate tectonic processes take place

Competency 4: The student will understand the importance of materials on the ocean floor.

The student will be able to:

- a. Explain the marine and terrestrial processes that determine the distribution of sediments and mineral resources of the ocean floor
- b. Evaluate the role that shell building organisms play in the accumulation of important sediment types and in moderating the chemistry of the oceans

Competency 5: The student will demonstrate an understanding of ocean temperatures and salinity.

The student will be able to:

- a. Evaluate the importance of the vertical thermal gradient in the oceans and its importance in coastal water temperature and climate moderation
- b. Analyze the physics of upwelling and its importance in coastal water temperature and climate moderation
- c. Discover what makes the oceans salty
- d. Describe how salinity varies in the oceans and the importance of rivers and ice in salinity variation

Competency 6: The student will understand the water masses that make up the oceans.

The student will be able to:

- a. Identify large masses of water that have a common origin or source area
- b. Discuss the oceanographic, biological, and meteorological significance of water masses
- c. Evaluate the roles of temperature, salinity, and density in the formation and transport of water masses
- d. Calculate the temperature-salinity of a water sample and by plotting these two parameters identify its source area

Competency 7: The student will display a knowledge of surface currents.

The student will be able to:

- a. Graph the major movements of surface water in the oceans
- b. Observe how influence climate by redistributing energy from the sun and stored heat from the earth
- c. Analyze the roles that wind, gravity, and the earth's rotation play in determining the direction and velocity of ocean currents
- d. Describe the physics of upwelling and its importance of coastal water temperatures and climate moderation

Competency 8: The student will investigate the importance of waves in shallow water.

The student will be able to:

- a. Describe the changes that occur as a deep water wave approaches a shoreline
- b. Evaluate what causes waves to peak and break

- c. Explain how long shore currents and rip currents form
- d. Investigate the dynamics of sand, beach drifting, and beach erosion

Competency 9: The student will manipulate data involved in remote sensing.

The student will be able to:

- a. Explain the various uses of remote sensing systems
- b. Map sea surface temperatures and the extent of warm and cold water masses
- c. Map important area of phytoplankton productivity

Competency 10: The student will explain the factors affecting the distribution of marine life.

The student will be able to:

- a. Describe the different life zones of the ocean
- b. Evaluate the physical and chemical factors that control the distribution of life within and between these zones

Competency 11: The student will be able to discuss primary and secondary productivity.

The student will be able to:

- a. Describe the process of primary productivity and recognize its importance
- b. Examine the physical, chemical, and biological controls upon marine primary productivity both horizontally and vertically
- c. Relate secondary productivity to primary productivity

Competency 12: The student will evaluate marine ecosystems and nutrient cycles.

The student will be able to:

- a. Describe the role of the ocean as an ecosystem and nutrient recycler
- b. Analyze the interactions between and flow of energy through producers, consumers, and decomposers
- c. Evaluate how humans can disrupt marine ecosystems

Competency 13: The student will understand Paleoceanography.

The student will be able to:

- a. Describe how microfossils are used to construct relative time scales
- b. Reconstruct past environmental conditions and changes using microfossils