



# STAFFORD COUNTY PUBLIC SCHOOLS

## Curriculum Overview Earth Science Level II Oceanography

### **Course Description:**

In this course the theories of Earth's structure and plate tectonics will be presented as a base on which to build the explanation of the physical features of the ocean floor. Both historical and physical geology of the ocean floor will be investigated. Students will study the physical properties of sea water, marine chemistry, marine organisms, salinity and density, circulation within the oceans, waves, currents, tides, and oceanographic instruments and research. Emphasis will be placed on the major skills of practicing oceanographers and scientists.

### **Essential Skills/Processes:**

The goals of the course are to educate the student in the material content of the physical and biological aspects of the ocean, to increase science inquiry skills and logical thinking, and foster positive attitudes for further science study.

Students will be required to submit written laboratory reports and to design and conduct investigations in small groups, as an individual, or as a class.

- The student will investigate and understand the historical contributions made to the study of oceanography.
- The student will investigate and understand the geophysical features of the ocean
- The student will investigate and understand the chemical and physical properties of ocean water
- The student will investigate and understand the biological and ecological aspects of the ocean

### **Essential Knowledge:**

Essential knowledge and skills is categorized into six strands.

### **Science as Process:**

- Appropriate tools and instruments to collect, analyze, and report data and to demonstrate concepts.
- An emphasis on laboratory safety.

### **Water Characteristics:**

- Water chemistry including elements, chemical bonding, mass, nitrate cycle, pH, salinity, and dissolved oxygen.
- Physics of water including density, viscosity, specific gravity, Knudsen charts, temperature, sound transmission, light, electrical conductivity, surface tension, and satellite imaging.
- Aquarium setup and maintenance including component parts, salt mixes, and test kits.

**History:**

- Activities of early civilizations such as the Greeks, Romans, Vikings, and Phoenicians.
- Contributions by individuals such as Prince Henry, Dagama, Columbus, Magellan, Cook, Franklin, Cousteau, and others.
- Recent advances such as underwater habitats, acoustic advances, underwater TV and remote observation drones, minisubs, and others.
- Threats such as offshore dumping.
- The United Nations law of the Sea.

**Geophysical Changes Over Time:**

- Origin of the universe theory.
- Formation of galaxies, solar systems, planets, the atmosphere and oceans.
- Origin of life hypotheses.
- Plate tectonics including sea floor spreading and continental drift.
- Major plate names, the mid-ocean ridge system, and plate boundary types.
- Coastal processes including beach formation, beach types, longshore drift, erosion, sandbar formation, barrier islands.
- Influence of weather including hurricanes.
- Turbidity currents.
- Creation and evolution of the Chesapeake Bay Watershed
- Human impact on the Chesapeake Bay Watershed

**Water Movement:**

- Wave terminology including types, and wave parts.
- Wave velocity.
- Tsunamis.
- Features of currents including currents making up world gyres.
- Global wind belts, the coriolis effect.
- Surface current flow, geostrophic flow, and counter currents.
- Winter and summer monsoon affects; El Nino.
- Erosion.
- Aspects of tides including influence of moon, sun, wind, and rotation of the Earth.
- Types and characteristics of tides; tide tables.
- Satellite monitoring of tidal activity.

**Biological and Ecological Aspects:**

- Anatomy and physiology of marine organisms
- Characteristics of bony and cartilaginous fishes, including behavior and anatomy
- Microscopic study of mastigophora, sarcodina, ciliophora, and diatoms.
- Impact of microorganisms on food chains..
- Study of multicellular invertebrate anatomy and life cycles to include porifera, coelenterata, echinodermata, mollusca, annelida, and arthropoda.
- Techniques in the study of live and prepared specimens.
- Oceanic zones and life found in each.