



# STAFFORD COUNTY PUBLIC SCHOOLS

## Curriculum Overview Earth Science Level II

### **Course Description:**

This is an in-depth course dealing with the physical and historical aspects of the Earth most suited for students who have a strong interest in science. Emphasis will be placed on those geological processes and features that the student has encountered or may encounter during his lifetime. Extensive laboratory experiences and occasional field excursions are provided to enhance the students understanding and application of the course material.

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

The goals of the course are to educate the student in the material content of Earth Science Level II, to increase science inquiry skills and logical thinking, and foster positive attitudes for further science study. There will be preparation for the Earth Science Standards of Learning Test.

- The student will investigate and understand how to read and interpret maps, globes, models, charts, and imagery
- The student will investigate and understand the characteristics of the Earth and the solar system
- The student will investigate and understand how to identify major rock-forming and ore minerals based on physical and chemical properties
- The student will investigate and understand the rock cycle as it relates to the origin and transformation of rock types and how to identify common rock types based on mineral composition and textures
- The student will investigate and understand the difference between renewable and nonrenewable resources
- The student will investigate and understand geologic processes including plate tectonics
- The student will investigate and understand how freshwater resources are influenced by geological processes and the activities of humans
- The student will investigate and understand that many aspects of the history and evolution of the Earth and life can be inferred by studying rocks and fossils
- The student will investigate and understand that oceans are complex, interactive physical, chemical, and biological systems and are subject to long- and short-term variations
- The student will investigate and understand the origin and evolution of the atmosphere and the interrelationship of geologic processes, biologic processes, and human activities on its composition and dynamics
- The student will investigate and understand that energy transfer between the sun and the Earth and its atmosphere drives weather and climate on Earth
- The student will investigate and understand scientific concepts related to the origin and evolution of the universe

### **Essential Knowledge:**

Essential knowledge and skills is categorized into six strands.

### **Science as Process:**

Appropriate tools and technologies such as computers, probeware, and global positioning systems (GPS) are used to collect, analyze, and report data and to demonstrate concepts.

Scales, diagrams, maps, charts, graphs, tables, and profiles constructed and interpreted.

Skills in interpreting maps and imagery including bathymetric, geologic, topographic, and weather maps, star charts, aerial photography and satellite images.

Direction and distance measurement, location by latitude and longitude, and topographic profiles will be determined.

Variables are manipulated with repeated trials.

Volume, area, mass, elapsed time, direction, temperature, pressure, density, distance, and changes in elevation/depth calculated using appropriate tools.

A scientific viewpoint constructed using observation and logic to reach conclusions.

Informed judgements used in making decisions on resource use.

An emphasis on laboratory safety.

**Physical Geology:**

Plate tectonics, continental drift, and sea floor spreading.  
Igneous, sedimentary, and metamorphic rocks.  
Mineral properties including hardness, color and streak, luster, cleavage, fracture, and unique properties.  
Process of soil development.  
Development of karst topography.  
Identification of groundwater zones and other sources of freshwater including rivers, springs, and aquifers with reference to the hydrologic cycle.  
Geologic processes evidenced in the physiographic provinces of Virginia including the Coastal Plain, Piedmont, Blue Ridge, Valley and Ridge, and Appalachian Plateau.  
Identification of major watershed systems in Virginia including the Chesapeake Bay and its tributaries.

**Meteorology:**

Scientific evidence for atmospheric changes over time.  
Observation and collection of weather data.  
Prediction of weather patterns.  
Severe weather occurrences such as tornadoes, hurricanes, and major storms.  
Weather phenomena and the factors that affect climate including radiation and convection.  
Energy transfer between the sun, Earth, and the Earth's atmosphere.  
Potential changes in the Earth's atmosphere due to human, biologic, and geologic activity.

**Astronomy:**

Scientific concepts related to the origin and evolution of the universe.  
Characteristics of the sun, planets and their moons, comets, meteors, and asteroids.  
Cosmology (the Big Bang).  
The origin of stars and stellar systems; stellar evolution.  
Nebulae and galaxies.  
History and contributions of the space program.

**Historical Geology:**

Concept of geologic time.  
Superposition, cross-cutting relationships, index fossils, and radioactive decay as methods of dating bodies of rock.  
Remains of ancient and extinct life preserved as fossils.  
Rocks and fossils from different geological periods and epochs found in Virginia.

**Oceanography:**

Physical and chemical changes in the oceans including waves, currents, tides, upwelling, sea level variations, and salinity.  
Systems interactions (density differences, energy transfer, weather, and climates).  
Features of the sea floor including those reflecting tectonic processes.

Economic and public policy issues concerning the oceans and the coastal zone including the Chesapeake Bay.

**Resources:**

- Stafford County Public Schools: <http://www.staffordschools.net>
- High School Program of Studies:

[http://stafford.schoolfusion.us/modules/groups/homepagefiles/cms/120789/File/Parent%20and%20Student%20Forms/2010\\_2011%20High%20School%20Course%20Catalog.pdf?sessionId=1c7e1960147c9d23991284967a7b7b9e](http://stafford.schoolfusion.us/modules/groups/homepagefiles/cms/120789/File/Parent%20and%20Student%20Forms/2010_2011%20High%20School%20Course%20Catalog.pdf?sessionId=1c7e1960147c9d23991284967a7b7b9e)

- VA Standards of Learning: <http://www.doe.virginia.gov/VDOE/Superintendent/Sols/home.shtml>
- School Report Card (VA Department of Education): <https://p1pe.doe.virginia.gov/reportcard/>
- Jefferson Lab SOL review: <http://education.jlab.org/solquiz/>