

# HiSET Preparation - Science Part 1

## Course Overview

The HiSET Preparation Courses were developed by aligning Plato Courseware with the strands and topics that are assessed on the 2014 HiSET Test. Each unit aligns to one or more strands within the 2014 HiSET Test and the modules within each unit target the essential concepts of the Next Generation Science Standards as assessed on the HiSET Test for Science. This course focuses on the subject areas of Life Science and Earth and Space Science. In this course, you will find a variety of lessons and activities to improve your knowledge of these concepts.

## Course Goals

By the end of this course, you will:

- Understand the vocabulary and key concepts of Life Science and Earth and Space Science
- Explore the definition of life and the chemistry of cells while comparing and contrasting cell types, feedback mechanisms, and the phases of the cell cycle
- Understand the transfer of energy in the ecosystem and the major biogeochemical cycles
- Explore the productivity of an ecosystem and its use in measuring the efficiency of that ecosystem
- Understand the concepts of homeostasis, stimulus and response, plant tropisms, and innate and learned behavior
- Explore the concepts of biomes and biodiversity, and understand how population numbers and distribution are kept in balance in nature
- Understand community structure in ecosystems
- Explore the key concepts of genetics, heredity, and evolution
- Understand the organization of the universe and the solar system including the characteristics, location, and motion of its components
- Explore the composition of the Earth, including the atmosphere and plate tectonics.
- Understand the characteristics of natural calamities such as earthquakes and volcanoes
- Explore characteristics of weathering and erosion
- Understand the water cycle, the movement of water, and physical characteristics of the ocean's layers and floor
- Understand the sources and importance of fresh water
- Understand the characteristics of weather and climate, as well as the difference between the two
- Explore the effects of pollution and global warming

- Explore ecological succession, global ecological issues, and animal behavior in terms of adaptability in nature

## General Skills

To participate in this course, you should be able to do the following:

- Complete basic operations with word processing software, such as Microsoft Word or Google Docs.
- Complete basic operations with presentation software, such as Microsoft PowerPoint or Google Docs presentation.
- Perform online research using various search engines and library databases.
- Communicate through email.

*For a complete list of general skills that are required for participation in online courses, refer to the Prerequisites section of the Plato Student Orientation document, found at the beginning of this course.*

## Course Materials

- notebook
- pencils or ink pens
- computer with Internet connection and speakers or headphones
- Microsoft Word or equivalent
- Microsoft PowerPoint or equivalent

## Course Structure

### Unit 1: Life Science: From Molecules to Organisms: Structures and Processes

#### Summary

Unit 1 begins by exploring the definition of life and the six characteristics or requirements for life. Students will study the chemistry of living cells in terms of matter as consisting of atoms, molecules, ionic compounds, and organic and inorganic compounds. This unit also explores organic molecules that are necessary for life based on general structures, properties, or function in a cell. The unit then moves on to the study of the cell structures of prokaryotic and eukaryotic cells and differences in specialization cells. Students will also understand the importance of feedback mechanisms. At the end of this unit, students will explore the phases and functions of the cell cycle.

## Unit 2: Life Science: Ecosystems: Interactions, Energy, and Dynamics

### Summary

Unit 2 begins by describing the flow of energy through an ecosystem and the major biogeochemical cycles of an ecosystem. Students also learn how productivity can be measured and used to determine the efficiency of an ecosystem. The unit also covers the concepts of plant tropisms, homeostatic responses, internal and external stimuli, responses to stimuli and innate and learned behavior. Unit 2 also includes the concepts of a niche, the principle of exclusion, and the use of J and S curves to map the growth patterns of organisms. The unit concludes with the study of factors that determine community structure in ecosystems.

## Unit 3: Life Science: Heredity: Inheritance and Variation of Traits

### Summary

This unit provides an understanding of genetics, genetic traits, and heredity. Unit 3 includes lessons that explore how sexual reproduction contributes to genetic diversity and the concepts of Mendelian genetics. Toward the end of the unit, students will explore genes and their functions in terms of DNA, RNA, and proteins. Students will also learn about mutations in cells and their role in altering proteins.

## Unit 4: Life Science: Biological Evolution: Unity and Diversity

### Summary

Unit 4 focuses on the key concepts of evolution. Students will study the key terms and definitions of evolution. The unit begins with the study of the concepts and examples of natural and artificial selection and speciation. Students will also explore the different types of fossils and the four eras of the geologic time scale. This unit also covers the study of substances produced by living organisms (biotic substances) and substances resulting from non-living processes (abiotic substances). This unit then explores Darwin's theory of natural selection. Students will conclude this unit with the study of microevolution, adaptive evolution, punctuated equilibrium, and macroevolution.

## Unit 5: Earth and Space Sciences: Earth's Place in the Universe

### Summary

Unit 5 provides an understanding of the origin and evolution of the solar system. Students will then learn about the origins and motions of the sun, moon, and Earth, and their relation to eclipses, the pull of tides and change of seasons. This unit also explores the organization of the universe. This unit also covers lessons which study the characteristics of stars and their location in the night sky. Students will also study the size, shape, and movement of galaxies.

## Unit 6 & 7: Earth and Space Sciences: Earth's Systems

### Summary

Unit 6 begins by distinguishing the layers of the earth, both above and below the crust, by both composition and characteristics. Students will also learn about the plate tectonic theory and its role in the creation of landforms. This unit also provides an understanding of the characteristics and types of earthquakes and volcanoes. Students will also study soil and its formation, and the role that weathering and erosion play in creating soil and its impact on soil fertility.

Unit 7 provides an understanding of how the water cycle works and the movement of water, including wave action and the role of currents and tides in the ocean. The unit also explores the characteristics of layers of the ocean, zones of marine life, and features of the ocean floor. Students will also examine the sources of fresh water, the effects of running water on Earth's surface, and impact of pollution and conservation on Earth's water resources. The latter part of the unit shows students the difference between weather and climate. This unit examines atmospheric temperature, clouds, and wind. Students also explore how weather is formed, types of weather, weather maps, and climatic zones. Unit 7 also discusses the topics of pollution and global warming.

## Unit 8: Earth and Space Sciences: Earth and Human Activity

### Summary

Unit 8 begins by examining how ecological succession can change environments and lead to the formation of new biomes. The unit then discusses the major global ecological issues arising due to human activity. The unit covers increasing carbon emissions and greenhouse gases, climate change, pollution, habitat loss and species extinctions, overpopulation and depletion of natural resources. Students conclude this unit by exploring animal behaviors in terms of innate and learned behaviors, communication and social grouping between animals. Students also study how an animal's behavior patterns affect its adaptability in nature.