Biology Course Syllabus

Course Description:
In Biology students will be introduced to the definition of biology, its key chemical attributes, and a brief history of life on earth. Students will also learn key principles of ecology, and will study the biosphere. The students will gain a deep understanding of the cell, the smallest unit of life, including its structure and function, as well as the different types of cells, the power of genetics, and how species evolve over time. Students will learn about and appreciate the interesting nature of bacteria, viruses, and protists, and will learn about the large diversity of plants, their types, and adaptations. Students will also learn about fungi, invertebrates, chordates, and will gain a deep understanding of human physiology, including all of its biological systems.

Part 1: 5 credit hours
Part 2: 5 credit hours

Course Outline

California Standards

Biology, Part 1

Unit 1: The Study of Life

1.1 What is Biology
1.2 The Chemistry of Life
1.3 A Brief History of Life

In Unit 1 students will learn:
To analyze what the study of life (biology) entails as well as the building blocks for life.
That all cellular functions are ultimately chemistry, and the importance of carbon to living things.
To recognize the most important molecules for living processes.
How life arrived and evolved on the planet.
[1a, 1b, 1f, 1h]

Unit 2: Ecology & the Biosphere

2.1 The Biosphere
2.2 Ecosystems and Communities
2.3 Populations

In Unit 2 students will learn:
How organisms interact to form larger systems on earth.
The concept of a biosphere and how earth is a biosphere will be the starting point, followed by ecosystems and communities.
To understand how populations exist in environments, and the impact of humans in the biosphere.
How humans have a particular impact on ecological processes on earth.
[6a, 6b, 6c, 6d, 6e, 6f, 6g]

Unit 3: The Basic Unit of Life

3.1 Basic Cell Structure
3.2 Photosynthesis
3.3 Cellular Respiration
3.4 Mitosis and Meiosis

In Unit 3 students will learn:
That the basic unit of life is the cell.
The basic cell structure, including the organelles in eukaryotic cells and the basic components of prokaryotic cells.
Key cell processes, like photosynthesis in plants, and respiration.
The detailed steps and the importance of mitosis and meiosis.
[1a, 1b, 1c, 1d, 1e, 1f, 1g, 1h, 1i, 1j, 2a, 2b]

Unit 4: Genetics

4.1 Heredity
4.2 Replication
4.3 Transcription and Translation
4.4 Genetic Modification

In Unit 4 students will learn:
The basics of genetics and their involvement in the inheritance of organisms from their ancestors.
The complex processes of replication, transcription and translation, as the mechanisms behind inheritance.
Advances in Genetic modification, with a focus on the scientific principals behind the concept.
[1b, 1d, 2a, 2b, 2c, 2d, 2e, 2f, 2g, 3a, 3b, 3c, 3d, 4a, 4b, 4c, 4d, 4e, 4f, 5a, 5b, 5c, 5d, 5e]

Unit 5: Evolution

5.1 Darwin's Theory
5.2 Speciation
5.3 The Fossil Record
5.4 Classification

In Unit 5 students will learn:
The key points in Darwin's theory of evolution, as well as how he came to the conclusions that he did.
The idea of speciation, how new species arise, will be covered.
The study of the fossil record and the information that it provides.
The principles of Classification, as well as the development of how scientists have refined the process of classification, and the different methods of classification; including DNA analysis and homologous traits.
[7a, 7b, 7c, 7d, 7e, 7f, 8a, 8b, 8c, 8d, 8e, 8f, 8g]

Unit 6: Bacteria, Viruses, & Protists

6.1 Bacteria
6.2 Viruses
6.3 Protists

In Unit 6 students will learn:
The basics of the simpler forms of life, including bacteria and protists.
The cell structure of bacteria, as well as methods of reproduction.
The characteristics of viruses and why viruses are not considered to be living organisms by many scientists.
[1a, 1c, 6e]

Course Outline

California Standards

Biology, Part 2

Unit 1: Plants

1.1 Types of Plants
1.2 Parts of the Plant
1.3 Non-Vascular Plant Reproduction
1.4 Vascular Plant Reproduction
1.5 Cool Plant Adaptations

In Unit 1 students will learn:
About the many and diverse types of plants, including both vascular and non-vascular plants.
The characteristics of angiosperms and gymnosperms.
The different parts of plants, and their varying methods of reproduction; both sexual and asexual.
The many and amazing plant adaptations.
[1f, 1j, 6e]

Unit 2: Fungi

2.1 Characteristics & Classification of Fungi
2.2 Fungal Diseases
2.3 Cool Fungi Adaptations

In Unit 2 students will learn:
The different types of fungi and their characteristics.
How fungi interact with humans, including common fungal diseases found in humans.
Some bizarre and amazing fungal adaptations, allowing for their diverse and improbable habitats.
[6e, 10b]

Unit 3: Invertebrates

3.1 Sponges
3.2 Cnidarians
3.3 Worms and Arthropods
3.4 Mollusks
3.5 Echinoderms

In Unit 3 students will learn:
The characteristics of the different types of invertebrates, including sponges, cnidarians, worms and arthropods, mollusks, and echinoderms.
How the above organisms differ as well as their respective roles in the natural world.
[9a, 9b, 9c, 9d, 9e, 9f, 9g]

Unit 4: Chordates

4.1 Non-Vertebrate Chordates
4.2 Fish
4.3 Reptiles
4.4 Amphibians
4.5 Birds
4.6 Mammals

In Unit 4 students will learn:
The basic anatomy and ecological role of chordates, including non-vertebrate chordates, fish, reptiles, amphibians, birds, and mammals.
To distinguish between the different chordates.
How the many and varying chordates are interrelated and interdependent.
[9a, 9b, 9c, 9d, 9e, 9f, 9g, 9h, 9i, 10a, 10b, 10c, 10d]

Unit 5: Human Anatomy

5.1 Skeletal System
5.2 Muscular System
5.3 Integumentary System
5.4 Nervous System
5.5 Circulatory and Respiratory System

In Unit 5 students will learn:
Human anatomy, including the skeletal, muscular, integumentary, nervous, and circulatory and respiratory systems.
The key functions of each of these systems, as well as how they interact with one another.
Disorders and diseases associated with each human biological system.
[9a, 9b, 9c, 9d, 9e, 9f, 9g, 9h, 9i]

Unit 6: Human Anatomy (continued)

6.1 Digestive System
6.2 Excretory System
6.3 Endocrine System
6.4 Reproductive System
6.5 The Immune System

In Unit 6 students will learn:
Human anatomy, including the digestive, excretory, endocrine, reproductive, and immune systems.
The key functions of each of these systems, as well as how they interact with one another.
Disorders and diseases associated with each human biological system.
[9a, 9b, 9c, 9d, 9e, 9f, 9g, 9h, 9i, 10a, 10b, 10c, 10d,10e, 10f]