Odysseyware®

CURRICULUM OVERVIEW

Biology

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Biology Course Overview

Biology is intended to expose students to the designs and patterns of living organisms and their interactions with the environment. In preceding years, students should have developed a foundational understanding of life sciences. Expanding on that, this Biology course will incorporate more abstract knowledge. The student's understanding should encompass both the micro and macro aspects of life, and this biology course includes both. The major concepts covered are taxonomy, the chemical basis of life, cellular structure and function, genetics, microbiology, plant structure and function, animal structure and function, and ecology and the environment.

Students at this level should show development in their understanding of scientific inquiry. The units contain experiments and projects that seek to develop a deeper conceptual meaning for students and that actively engage them. The continued exposure of science concepts and scientific inquiry will serve to improve the students' skills and understanding.
Biology should be preceded or accompanied by an Algebra I course.

- **Biology:** The Study of Life: Students will learn the scientific method, identify the characteristics of life, and how living organisms are classified.
- **Biochemistry:** Students will explore the chemicals and reactions of life.
- **Cells:** Students will identify the structure and functions of plant and animal cells.
- **Cell Energy:** Students will explore the energy flow in cells and ecosystems, including photosynthesis and cellular respiration.
- **Cell Division and Reproduction:** Students will explore the processes involved in cell division and reproduction.
- **Genetics and Heredity:** Students will learn about genetics, heredity, and the patterns and evidence of evolution.
- **Microbiology and Biodiversity:** Students will examine the different kingdoms, Protista, fungi, plantae, and Animalia
- **Plants:** Students will recognize that plants create their own energy via photosynthesis, how plants grow and reproduce, and their uses.
- **Animals and Humans:** Students will learn the body systems of animals and humans.
- **Ecology and the Environment:** Students will explore the interactions between living organisms and the environment.

Biology

Unit 1: Biology: The Study of Life

Assignments

1. Course Overview
2. What is Life
3. Introduction to Biology
4. Project: Characteristics of Life
5. Quiz 1: Life Science
6. Scientific Inquiry
7. The Scientific Method
8. Project: The Scientific Method
9. Laboratory Safety
10. Quiz 2: Scientific Investigation
11. Introduction to Taxonomy
12. Taxonomy: Classification and Naming
13. Keys to Classification
14. Project: Classifying Fruit
15. Project: Keying Plants*
16. Project: Keying Animals*
17. Quiz 3: Taxonomy
18. Special Project*
19. Test
20. Alternate Test*
21. Glossary and Credits

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Unit 2: Biochemistry

Assignments

1. Life Chemistry
2. Atoms, Elements, and Compounds
3. Chemical Bonds
4. Experiment: Static Electricity
5. Chemical Reactions
6. Quiz 1: Introduction to Biochemistry
7. Chemistry of Water
8. Experiment: Water Properties
9. Acids, Bases, and pH
10. Experiment: pH Indicators
11. Carbon of Life
12. Quiz 2: Biochemical Essentials
13. Carbohydrates and Lipids
14. Experiment: Sugar and Starch
15. Proteins, Enzymes, and Nucleic Acids
16. Experiment: Enzyme Action
17. Nutrition
18. Research Paper: Why Eat Your Greens
19. Quiz 3: Macromolecules
20. Special Project
21. Test
22. Alternate Test
23. Glossary and Credits

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Unit 3: Cells

Assignments

1. Cell Theory
2. Project: Introducing the Microscope
3. Cell Overview
4. Quiz 1: Introduction to Cells
5. Cell Structures and Functions
6. Project: Plant, Animal, and Algae Cells
7. The Plasma Membrane
8. Project: Virtual Lab - Osmosis
9. Experiment: Osmosis
10. Quiz 2: Cell Structures
11. Cell Regulation
12. Project: Homeostasis
13. Quiz 3: Homeostasis
14. Special Project*
15. Test
16. Alternate Test*
17. Glossary and Credits

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Unit 4: Cell Energy

Assignments

1. Laws of Thermodynamics
2. Energy Transformations
3. Project: Energy Laws
4. Quiz 1: Introduction to Energy
5. Photosynthesis: Energy Production in Plants
6. Experiment: Photosynthesis Reactions
7. Cellular Respiration: Anaerobic Phase
8. Cellular Respiration: Aerobic Phase
9. Project: Respiration in Muscles
10. Quiz 2: Intracellular Energy
11. Energy Flow in Ecosystems
12. Project: Energy Flow in Ecosystems
13. Quiz 3: The Flow of Energy
14. Special Project
15. Test
16. Alternate Test
17. Glossary and Credits

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Unit 5: Cell Division and Reproduction

Assignments

1. Types of Reproduction
2. Experiment: Asexual Plant Reproduction
3. Fertilization
4. Project: Reproduction Research
5. Quiz 1: Introduction to Reproduction
6. Cell Division: Fission
7. Project: Fragmentation
8. Cell Division: Mitosis
9. Project: Stages of Mitosis
10. Cell Division: Meiosis
11. Quiz 2: Types of Cell Division
12. Cell Cycle and Regulation
13. Cell Differentiation
14. Project: Stem Cell Research
15. Quiz 3: Cell Cycles and Growth
16. Special Project*
17. Test
18. Alternate Test*
19. Glossary and Credits

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Unit 6: Semester Review and Exam

Assignments

1. Review
2. Exam
3. Alternate Exam- Form A
4. Alternate Exam- Form B

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Unit 7: Genetics and Heredity

Assignments

1. DNA and RNA
2. Project: Building DNA
3. Chromosomes and Genes
4. Project: Karyotypes
5. Experiment: Molecular Genetics*
6. Quiz 1: The Molecules of Genetics
7. Mendelian Genetics
8. Inheritance
9. Project: Punnett Squares
10. Probability
11. Project: Testing Probability
12. Quiz 2: Patterns of Inheritance
13. Evolutionary Basics
14. Project: Natural Selection
15. Patterns of Evolution
16. Evolutionary Evidence
17. Project: Morphology
18. Quiz 3: Introduction to Evolution
19. Special Project*
20. Test
21. Alternate Test*
22. Glossary and Credits

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Unit 8: Microbiology and Biodiversity

Assignments

1. Archaea and Eubacteria Kingdoms
2. Bacteria
3. Viruses
4. Project: Pathogens—Bacteria or Virus?
5. Quiz 1: Prokaryote Kingdoms
6. Protista Kingdom: The Protozoa
7. Project: Protozoan Cultures
8. Protista Kingdom: Algae
9. Project: Algae Cultures
10. Fungi Kingdom
11. Project: Fungi Cultures
12. Quiz 2: Protista and Fungi Kingdoms
13. Plantae Kingdom
14. Animalia Kingdom: Invertebrates
15. Animalia Kingdom: Chordates and Vertebrates
16. Project: Plant and Animal Research
17. Quiz 3: Plantae and Animalia Kingdoms
18. Special Project*
19. Test
20. Alternate Test*
21. Glossary and Credits

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Unit 9: Plants

Assignments

1. Cells and Tissues
2. Organs
3. Experiment: Stem Transport
4. Quiz 1: Plant Structures
5. Plant Necessities
6. Reproduction
7. Experiment: Flower Dissection
8. Experiment: Seed Dissection*
9. Experiment: Cones*
10. Growth and Development
11. Control Systems
12. Experiment: Plant Growth
13. Quiz 2: Plant Reproduction and Growth
14. History and Diversity
15. Uses of Plants
16. Project: Plant Usage
17. Quiz 3: Plant History and Usage
18. Special Project*
19. Test
20. Alternate Test*
21. Glossary and Credits

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Unit 10: Animals and Humans

Assignments

1. Cells and Tissues
2. Experiment: Animal Cells and Tissues
3. Invertebrates
4. Project: Animal Organ Systems
5. Experiment: Heart Rate
6. Quiz 1: Animal Structures
7. Animals: Body Plans
8. Animals: Body Communication and Response
9. Animals: Movement, Reproduction, and Development
10. Experiment: Mealworm
11. Project: Animal Study
12. Quiz 2: Animal Anatomy and Physiology
13. Humans: Body Communication and Response
14. Project: Nervous and Endocrine System
15. Project: Virtual Lab- Frog Dissection Musculoskeletal
16. Humans: Acquisition and Excretion
17. Project: Digestive, Circulatory, and Respiratory Disorders
18. Experiment: Digesting Fats
19. Experiment: Carbon Dioxide
20. Project: Heart or Lung Study
21. Humans: Movement and Reproduction
22. Project: Muscle, Skeletal, and Reproductive Disorders
23. Humans: Immunity and Homeostasis
24. Project: Immunity and Lymphatic Disorders
25. Quiz 3: Human Anatomy and Physiology
26. Project: Virtual Lab- Frog Dissection Internal Organ
27. Special Project
28. Test
29. Alternate Test
30. Glossary and Credits

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Unit 11: Ecology and the Environment

Assignments

1. The Study of Animal Behavior
2. Animal Behavior and Interdependencies
3. Project: Symbiosis
4. Quiz 1: Animal Behaviors
5. The Study of Ecology
6. Organisms and Their Environment
7. Project: Food Webs
8. Project: Habitats
9. Ecosystems and Biomes
10. Project: Local Ecosystems
11. Project: Biomes
12. Human Interaction
13. Project: Virtual Lab - Biome: Deciduous Forest
14. Project: Virtual Lab - Biome: Tundra
15. Experiment: Biodegradability
16. Project: Stewardship
17. Quiz 2: Ecological Relationships
18. Biotechnology
19. Project: Virtual Lab - Biome: Rainforest
20. Project: Ethics in Biotechnology
21. Quiz 3: The Future of Biology
22. Special Project
23. Test
24. Alternate Test
25. Glossary and Credits

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Unit 12: Semester Review and Exam

Assignment Titles

1. Review
2. Exam
3. Alternate Exam—Form A
4. Alternate Exam—Form B

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Unit 13: Final Exam

Assignment Titles

1. Exam
2. Alternate Exam-Form A
3. Alternate Exam—Form B

(*) Indicates alternative assignment