2015 Curriculum Catalog

Biology

Released 4/1/15

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COURSE OVERVIEW

Biology is intended to expose students to the designs and patterns of living organisms that have been created by God. In preceding years, students should have developed a foundational understanding of life sciences. This biology course will expand upon that knowledge and 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, botany, human anatomy and physiology, and ecological principles.

Students at this level should show development in their ability and understanding of scientific inquiry. The units contain experiments and projects that seek to develop a deeper conceptual meaning for the student and actively engage the student. The continued exposure of science concepts and scientific inquiry will serve to improve the student's skill and understanding.

Biology should be preceded or accompanied by an Algebra I course.

Upon completion of the course, students should be able to do the following:

- Classify different animals using taxonomy.
- Demonstrate a knowledge of molecular structure as it relates to organic compounds.
- Use a microscope to study microscopic organisms.
- Describe cells, their different parts, and the function of a cell.
- Discuss the different parts of a plant.
- Describe and explain the function of each system in the human body.
- Perform Punnett square functions to determine probability of inheritance.
- Differentiate between mitosis and meiosis and between asexual and sexual reproduction.
- Understand the impact man has on the environment.

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UNIT 1: TAXONOMY: KEY TO ORGANIZATION

Assignment Titles

1. Course Overview
2. The History of Taxonomy
3. Quiz 1
4. Binomial Nomenclature
5. Concept of Species
6. Quiz 2
7. Plant and Animal Classification
8. Experiment: Fruit
9. Activity: Keying Plants*
10. Activity: Keying Animals*
11. Search For A System
12. Quiz 3
13. Taxonomy and Origins
14. Models of Origin
15. Project: Research
16. Project: Origins*
17. Quiz 4
18. Special Project*
19. Test
20. Alternate Test*
21. Reference

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UNIT 2: CHEMISTRY OF LIFE

Assignment Titles

1. Molecular Basis of Life
2. Quiz 1
3. Properties of Compounds
4. Experiment: Static Electricity
5. Covalent Bonding
6. Experiment: Temperature Control*
7. Importance of Inorganic Compounds
8. Experiment: Water Properties
9. Experiment: Indicators*
10. Quiz 2
11. Chemical Reactions
12. Quiz 3
13. Organic Compounds
14. Carbohydrates
15. Experiment: Starch*
16. Lipids
17. Nucleic Acids
18. Quiz 4
19. Enzymes
20. Experiment: Digestion*
21. Quiz 5
22. Special Project*
23. Test
24. Alternate Test*
25. Reference

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UNIT 3: CELLS

Assignment Titles

1. The Microscope
2. Experiment: Introducing the Microscope
3. Experiment: Plant, Animal, and Algae Cells
4. Experiment: Onion Cells*
5. Quiz 1
6. Cell Design
7. Cell Membrane Function
8. Experiment: Osmosis
9. Organelles
10. The Microscope
11. Production of Needed Material
12. Quiz 2
13. Cells in Organisms
14. Experiment: Tissues*
15. Quiz 3
16. Special Project*
17. Test
18. Alternate Test*
19. Reference

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UNIT 4: CELL DIVISION AND REPRODUCTION

Assignment Titles

1. Cell Division
2. Meiosis
3. Stages of Mitosis
4. Experiment: Mitosis
5. Quiz 1
6. Asexual Reproduction
7. Experiment: Regeneration*
8. Plants
9. Experiment: Bulb Structure
10. Practical Applications in Plants
11. Experiment: Cuttings*
12. Quiz 2
13. Sexual Reproduction
14. Fertilization
15. Experiment: Sexual Reproduction*
16. Quiz 3
17. Sexual Reproduction in Animals
18. Experiment: Tissue Structure
19. Metamorphosis
20. Quiz 4
21. Sexual Reproduction in Plants
22. Life Cycles of Ferns and Pines
23. Experiment: Ferns and Pines*
24. Experiment: Flowers*
25. Quiz 5
26. Special Project*
27. Test
28. Alternate Test*
29. Reference

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UNIT 5: GENETICS: GOD'S PLAN OF INHERITANCE

Assignment Titles

1. Genetics: God's Plan of Inheritance
2. Probabilities
3. Experiment: Probability
4. Cross Predictions
5. Application of Mendelian Genetics
6. Quiz 1
7. Chromosome Basis of Heredity
8. Chromosomes in Meiosis
9. Sex Chromosomes
10. Quiz 2
11. Molecular Genetics
12. Experiment: Molecular Genetics
13. Quiz 3
14. Human Genetics
15. Factors Studied
16. Inherited Diseases
17. Quiz 4
18. Special Project*
19. Test
20. Alternate Test*
21. Reference

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UNIT 6: MICROBIOLOGY

Assignment Titles

1. Microbial Taxonomy
2. Fungi
3. Experiment: Fungus All Around (Part 1)
4. Experiment: Fungus All Around (Part 2)
5. Quiz 1: Microbial Taxonomy and Fungi
6. Animal-like Protists
7. Experiment: Protozoan Culture
8. Quiz 2: Animal-like Protists
9. Plant-like Protists (Algae)
10. Fungus-like Protists
11. Quiz 3: Plant- and Fungus-like Protists
12. Eubacteria
13. Activity: Pathogenic Bacteria Report
14. Archaea
15. Viruses, Prions, and Viroids
16. Experiment: Algae Observations*
17. Quiz 4: Eubacteria, Archaea, Viruses, Prions, and Viroids
18. Special Project*
19. Test: Microbiology
20. Alternate Test: Microbiology*
21. Reference

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UNIT 7: PLANTS: GREEN FACTORIES

Assignment Titles

1. How Is a Plant Made?
2. Parts of the Plant Cell
3. Anatomy and Morphology
4. Quiz 1
5. How do Plants Grow?
6. Experiment: Seeds
7. Developmental Anatomy
8. Quiz 2
9. How do Plants Work?
10. Photosynthesis: A Closer Look
11. Experiment: Terrarium*
12. Respiration
13. Quiz 3
14. How do Plants Help People?
15. Quiz 4
16. Special Project*
17. Test
18. Alternate Test*
19. Reference

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UNIT 8: HUMAN ANATOMY AND PHYSIOLOGY

Assignment Titles

1. Digestive System
2. Excretory System
3. Respiratory System
4. Circulatory System
5. The Heart
6. Experiment: Heart Rate
7. Quiz 1
8. Body Framework
9. Muscular System
10. Experiment: Muscle Types*
11. Reproductive System
12. Quiz 2
13. Environmental Interactions
14. Sensory Systems: The Eye
15. Sensory Systems: Hearing, Taste, Touch
16. Endocrine System
17. Immune System and Disease
18. Quiz 3
19. Special Project*
20. Test
21. Alternate Test*
22. Reference

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UNIT 9: ECOLOGY, POLLUTION, AND ENERGY

Assignment Titles

1. Principles of Ecology
2. Environmental Factors
3. Food Chains
4. Quiz 1
5. Ecological Relationships
6. Communities and Habitats
7. Experiment: Habitats
8. Experiment: Biomes*
9. Experiment: Quadrats*
10. Experiment: Inventory*
11. Quiz 2
12. Pollution Affects Ecology
13. Pollution Problems
14. Quiz 3
15. Energy Affects Ecology
16. Essay: Stewardship
17. Quiz 4
18. Special Project*
19. Test
20. Alternate Test*
21. Reference

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UNIT 10: PRINCIPLES AND APPLICATIONS OF BIOLOGY

Assignment Titles

1. Study of Life
2. Definition of Life
3. Quiz 1
4. Basic Principles of Life
5. Control System
6. Environment of Life
7. Quiz 2
8. Applications of Biology
9. Green Revolution
10. Quiz 3
11. Special Project*
12. Test
13. Alternate Test*
14. Reference

(*) Indicates alternate assignment