

Biology

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.

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.

| Unit 1: Biology: The Study of Life | |
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| Assignments | |
| Biology | 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 |

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

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

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

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

| Unit 6: Semester Review and Exam | |
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| Biology | Assignments |
| | 1. Review |
| | 2. Exam |

| Unit 7: Genetics and Heredity | |
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| Biology | 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 | |

| Unit 8: Microbiology and Biodiversity | |
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| Biology | 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 | |

| Unit 9: Plants | |
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| Biology | 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 | |

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

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

| Unit 12: Semester Review and Exam | | |
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| Assignment Titles | | |
| Biology | 1. Review | 3. Alternate Exam—Form A |
| | 2. Exam | 4. Alternate Exam—Form B |

| Unit 13: Final Exam | | |
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| Assignment Titles | | |
| Biology | 1. Exam | 3. Alternate Exam—Form B |
| | 2. Alternate Exam-Form A | |