

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	
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		
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		
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		
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		
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	
Biology	Assignments
	1. Review
	2. Exam

Unit 7: Genetics and Heredity	
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	
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	
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	
Assignments	
Biology	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

Unit 10: Animals and Humans	
Assignments	
Biology	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

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

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