

Biology Science

Key Instructional Activities

The Biology Georgia Standards of Excellence are designed to continue the student investigations of the life sciences that began in grades K-8 and provide students the necessary skills to be proficient in biology by focusing on the identification of patterns, processes, and relationships of living organisms. These standards include more abstract concepts such as the interdependence of organisms, the relationship of matter, energy, and organization in living systems, the behavior of organisms, and biological evolution. Students investigate biological concepts through experiences in laboratories and field work using the process of inquiry.

Biology students start by developing an understanding of the cellular structure and the role these structures play in living cells. The students develop a fundamental understanding of the role of bio-macromolecules, their structure and function as related to life processes. The students then analyze how genetic information is passed to their offspring and how these mechanisms lead to variability and hence diversity of species. They use cladograms and phylogenetic trees to determine relationships among major groups of organisms. Biology students are able to recognize the central role the theory of evolution plays in explaining how the diversity observed within species has led to the diversity of life across species through a process of descent with adaptive modification.



The Science Georgia Standards of Excellence drive instruction. Hands-on, student-centered, and inquiry-based approaches should be the emphasis of instruction. The standards are a required minimum set of expectations that show proficiency in science.



What resources are available for students and parents?

[EOC Biology Study Guide](#)

- ✓ Online Science Textbook
- ✓ Parent Portal
- ✓ Overview of Units and Pacing

Biology Course Overview

Unit 1: Macromolecules in Cell Processes

Expected Dates: Beginning of School Year to Mid-August

Building on standards from middle school, students will relate the structure of macromolecules to their interactions in carrying out cellular processes. Students will construct arguments supported by evidence to relate the structure of macromolecules (carbohydrates, proteins, lipids, and nucleic acids) to their interactions in carrying out cellular processes.

Unit 2: Cell as a System

Expected Dates: Mid-August to the End of August

Building on standards from middle school, students will identify the structures and functions of cell parts and explain that cell structures and organelles interact as a system to maintain homeostasis. Students will construct an explanation of how cell structures and organelles (i.e., nucleus, cytoplasm, cell membrane, cell wall, chloroplasts, lysosome, Golgi, endoplasmic reticulum, vacuoles, ribosomes, mitochondria) interact as a system to maintain homeostasis;

Unit 3: Role of Cell Transport in Maintaining Homeostasis

Expected Dates: First Week of September

Students will recognize that cellular transport is involved in maintaining homeostasis. Students will plan and carry out investigations to determine the role of cellular transport (e.g., active, passive, and osmosis) in maintaining homeostasis.

Unit 4: Cycling of Matter and Flow of Energy in Cells

Expected Dates: Second Week of September to Mid-September

Students will recognize the roles of photosynthesis and respiration in the cycling of matter and flow of energy within the cell. Students will ask questions to investigate and provide explanations about the roles of photosynthesis and respiration in the cycling of matter and flow of energy within the cell (e.g., single-celled alga).

Unit 5: Cell Reproduction

Expected Dates: Mid-Sept. to End of Sept.

Students will recognize the role of cellular reproduction in maintaining genetic continuity. Students will develop and use models to explain the role of cellular reproduction (i.e., binary fission, mitosis, and meiosis) in maintaining genetic continuity.

Unit 6: DNA and RNA and Genetic Variation

Expected Dates: Beginning of October to Mid-November

Students will construct an explanation of how the structures of DNA and RNA lead to the expression of information within the cell via the processes of replication, transcription, and translation. Students will construct an argument based on evidence to support the claim that inheritable genetic variations may result from new genetic combinations through meiosis (crossing over, nondisjunction); nonlethal errors occurring during replication (insertions, deletions, substitutions); and/or heritable mutations caused by environmental factors (radiation, chemicals, viruses)

Unit 7: Biotechnology

Expected Dates: Mid-November to First Week of December

Students will ask questions to gather and communicate information about the use and ethical considerations of biotechnology in forensics, medicine, and agriculture.

Unit 8: Mendel's Laws and Reproductive Variability

Expected Dates: First Week of January

Students will recognize that cellular transport is involved in maintaining homeostasis. Students plan and carry out investigations to determine the role of cellular transport (e.g., active, passive, and osmosis) in maintaining homeostasis.

Unit 9: Patterns of Inheritance

Expected Dates: Mid-January to End of January

Students will recognize that cellular transport is involved in maintaining homeostasis. Students will plan and carry out investigations to determine the role of cellular transport (e.g., active, passive, and osmosis) in maintaining homeostasis.

Unit 10: Advantages and Disadvantages of Sexual and Asexual Reproduction

Expected Dates: End of January to First Week in February

Students will recognize that cellular transport is involved in maintaining homeostasis. Students will plan and carry out investigations to determine the role of cellular transport (e.g., active, passive, and osmosis) in maintaining homeostasis.

Unit 11: Biodiversity and Populations in Ecosystems

Expected Dates: First Week of February

Students will recognize that cellular transport is involved in maintaining homeostasis. Students will plan and carry out investigations to determine the role of cellular transport (e.g., active, passive, and osmosis) in maintaining homeostasis.

Unit 12: Cycling of Matter and Flow of Energy in Ecosystems

Expected Dates: Second Week of February

Students will recognize that cellular transport is involved in maintaining homeostasis. Students will plan and carry out investigations to determine the role of cellular transport (e.g., active, passive, and osmosis) in maintaining homeostasis.

Unit 13: Organism Survival within Environmental Limits

Expected Dates: Mid-February to End of February

Students will recognize that cellular transport is involved in maintaining homeostasis. Students will plan and carry out investigations to determine the role of cellular transport (e.g., active, passive, and osmosis) in maintaining homeostasis.

Unit 14: Ecosystem Stability and Change

Expected Dates: End of February to First Week of March

Students will recognize that cellular transport is involved in maintaining homeostasis. Students will plan and carry out investigations to determine the role of cellular transport (e.g., active, passive, and osmosis) in maintaining homeostasis.

Unit 15: Reducing the Impact of Human Activity

Expected Dates: Second Week of March

Students will recognize that cellular transport is involved in maintaining homeostasis. Students will plan and carry out investigations to determine the role of cellular transport (e.g., active, passive, and osmosis) in maintaining homeostasis.

Unit 16: New Understandings of Earth's History, Speciation, and Genetics

Expected Dates: Third Week of March

Students will recognize that cellular transport is involved in maintaining homeostasis. Students will plan and carry out investigations to determine the role of cellular transport (e.g., active, passive, and osmosis) in maintaining homeostasis.

Unit 17: Patterns in Biodiversity

Expected Dates: Third Week of March

Students will recognize that cellular transport is involved in maintaining homeostasis. Students will plan and carry out investigations to determine the role of cellular transport (e.g., active, passive, and osmosis) in maintaining homeostasis.

Unit 18: Evidence of Common Descent

Expected Dates: End of March to First Week of April

Students will recognize that cellular transport is involved in maintaining homeostasis. Students will plan and carry out investigations to determine the role of cellular transport (e.g., active, passive, and osmosis) in maintaining homeostasis.

Unit 19: Changes in Populations: Natural Selection and Genetic Drift

Expected Dates: End of March to First Week of April

Students will recognize that cellular transport is involved in maintaining homeostasis. Students will plan and carry out investigations to determine the role of cellular transport (e.g., active, passive, and osmosis) in maintaining homeostasis.

Unit 20: Natural Selection and Biological Resistance

Expected Dates: First Week in April

Students will recognize that cellular transport is involved in maintaining homeostasis. Students will plan and carry out investigations to determine the role of cellular transport (e.g., active, passive, and osmosis) in maintaining homeostasis.

Unit 21: Patterns in Clades of Organisms and Common Ancestry

Expected Dates: Second Week of April

Students will recognize that cellular transport is involved in maintaining homeostasis. Students will plan and carry out investigations to determine the role of cellular transport (e.g., active, passive, and osmosis) in maintaining homeostasis.

Unit 22: Characteristics of Viruses and Organisms

Expected Dates: Third Week of April

Students will recognize that cellular transport is involved in maintaining homeostasis. Students will plan and carry out investigations to determine the role of cellular transport (e.g., active, passive, and osmosis) in maintaining homeostasis.

EOC Preparation/Administration and Enrichment

Expected Dates: Mid-April to End of School Year

Review all biology standards. Students will take the Biology EOC. Students will participate in enrichment activities.

Helpful Tips for Parents and Guardians

Believe that every child can be successful in science.

Science has led to the discovery of everything from gravity to medicine. Science is a way of understanding the world, a perspective, and a pattern of thinking that begins in the very early years. That is why parent involvement is so important in a child's science education.

Tips to Help Children Learn Science

Explore, explore, explore. See science everywhere. Always encourage your child to question their surroundings, and then discuss. Parents can take opportunities to ask, "What would happen if ...?" questions or present brainteasers to encourage children to be inquisitive and seek out answers.

Lead family discussions on science-related topics. Dinnertime might be an ideal time for your family to have discussions about news stories that are science based, like space shuttle missions, severe weather conditions, or new medical breakthroughs. Over time, children will develop a better understanding of science and how it affects many facets of our lives. Movies and TV shows with science-related storylines are also great topics for discussion.

Encourage girls and boys equally. Many fathers might be inclined to fix a problem for a daughter without challenging her to find the solution on her own. Many girls are left out of challenging activities simply because of their gender. Be aware that both girls and boys need to be encouraged and exposed to a variety of subjects at a very early age.

Do science together. Children, especially elementary-age children, learn better by investigating and experimenting. Simple investigations done together in the home can bolster what your child is learning in the classroom. Check with your child's teacher on what your child is currently learning in class and what activities you can explore at home. There are also many books on the market and [numerous websites](#) that present ideas for investigations.

In addition to exploring and communicating as a family, it is important to invest in your child's willingness to learn. There are many programs available that are fun and interactive, helping them build a solid foundation in science.

From life sciences to environmental science, physical science to earth science, when children express interests in these subjects, encourage them and learn with them.

How You Can Support Your Child's Success?

Although Georgia's approach to teaching and learning K-12 science is different than the past, you can still actively support your child's success in the classroom.

1. Speak to your child's teacher(s) about how these important changes affect your school.
2. Ask your child's teacher thoughtful questions based on the information provided in this brochure.
3. Learn how you can help the teacher(s) reinforce classroom instruction at home.
4. Visit www.georgiastandards.org for more information.