

Archdiocese of Philadelphia Secondary School System Biology Standards

The Catholic school community strives to make its faith commitment a complement to academic excellence by developing a curriculum that leads all students to Christ as it prepares them for a successful life in the twenty-first century. It is a curriculum that recognizes the sanctity of each human life while affirming the dignity of each person as a unique creation of God. It is a curriculum that is intended to offer all students the opportunity to study the world at many levels of complexity, through a variety of courses.

Schools of the Archdiocese of Philadelphia shall teach, challenge, and support every student to realize his/her maximum potential and to acquire the knowledge and skill to achieve the general standards in biology.

General Standards

- ◆ Life Forms
- ◆ Inheritance
- ◆ Evolution
- ◆ Cells
- ◆ Ecosystems
- ◆ Threatened, Endangered and Extinct Species
- ◆ Biology and Technology
- ◆ Inquiry

Standards Terminology Glossary

- ◆ General - Goals
- ◆ Content - What a student should know
- ◆ Competency - What a student should be able to do
- ◆ Assessment - How well a student should be able to perform
- ◆ Rubric - Scoring tool to evaluate the level of student performance

1. Life Forms

Content Standard

1.1. Similarities and differences found among living things.

Competency Standard

1.1.1. Use knowledge of anatomy of living things to use a classification key.

1.1.2. Describe organizing schemes of classification keys.

1.1.3. Identify and characterize major life forms by kingdom, phyla, class and order.

2. Inheritance

Content Standard

2.1. Passage of genetic information from one generation to the next.

Competency Standard

2.1.1. Compare and contrast the function of mitosis and meiosis.

2.1.2. Describe mutations' effects on a trait's expression.

2.1.3. Compare random and selective breeding practices and results.

2.1.4. Explain the functions of and functional relationships among DNA, genes and chromosomes.

2.1.5. Explain different types of inheritance (e.g., dominant, recessive, co-dominant, multiple allele and sex-influenced traits).

3. **Evolution**

Content Standard

3.1. Concepts and processes of evolution.

Competency Standard

- 3.1.1. Explain the role of mutations and gene recombination in changing a population of organisms.
- 3.1.2. Compare modern day descendants of extinct species and account for their present appearance.
- 3.1.3. Distinguish between inherited characteristics and learned behaviors in life forms.
- 3.1.4. Project changes based on a time line, which illustrate major events in the earth's development.
- 3.1.5. Apply the concept of natural selection to illustrate a species' survival, extinction, or change over time.

4. **Cells**

Content Standard

4.1. Chemical, structural and functional basis of living organisms.

Competency Standard

- 4.1.1. Know the role of hormones in regulating biologic activities.
- 4.1.2. Describe the relationship between the structure of organic molecules and the function they serve in living organisms.
- 4.1.3. Explain cell functions in terms of chemical reactions and energy changes.
- 4.1.4. Explain how cells store and use information to guide their functions.

5. Ecosystems

Content Standard

5.1. Biotic and abiotic components of an ecosystem and their interactions.

Competency Standard

- 5.1.1. Identify the major biomes and explain their similarities and differences.
- 5.1.2. Compare and contrast the interactions of biotic and abiotic components in an ecosystem.
- 5.1.3. Analyze the effects of abiotic factors on specific ecosystems.
- 5.1.4. Describe how the availability of resources affects organisms in an ecosystem.
- 5.1.5. Explain energy flow in a food chain through an energy pyramid.
- 5.1.6. Evaluate the efficiency of energy flow in a food chain.
- 5.1.7. Explain the concept of carrying capacity in an ecosystem.
- 5.1.8. Explain trophic levels.
- 5.1.9. Identify a specific environmental impact and predict what change may take place to affect homeostasis.
- 5.1.10. Examine and explain how organisms modify their environments to sustain their needs.
- 5.1.11. Assess the effects of latitude and altitude on biomes.
- 5.1.12. Interpret possible causes of population fluctuations.

Content Standard

5.2. Effect of cycles to ecosystem balance.

Competency Standard

- 5.2.1. Describe an element cycle and its role in an ecosystem.
- 5.2.2. Explain the consequences of interrupting natural cycles.

Content Standard

5.3. Change in ecosystems over time.

Competency Standard

- 5.3.1. Identify and explain the succession stages in an ecosystem.
- 5.3.2. Identify causes of succession.
- 5.3.3. Analyze consequences of interrupting natural cycles.

6. Threatened, Endangered and Extinct Species

Content Standard

6.1. Diversity significance within ecosystems.

Competency Standard

6.1.1. Explain the role that specific organisms have in their ecosystems.

6.1.2. Identify a species and explain what effects its increase or decline might have on the ecosystem.

6.1.3. Identify a species and explain how its adaptations are related to its niche in the environment.

Content Standard

6.2. Factors affecting plant survival.

Competency Standard

6.2.1. Describe an organism's adaptations for survival in its habitat.

6.2.2. Compare adaptations among species.

Content Standard

6.3. Adaptive mechanisms leading to specialization.

Competency Standard

6.3.1. Explain factors that could lead to a species' increase or decrease.

6.3.2. Explain how management practices may influence the success of specific species.

6.3.3. Identify and explain criteria used by scientists for categorizing organisms as threatened, endangered or extinct.

7. **Biology and Technology**

Content Standard

7.1. Biochemical technologies related to plant propagation, growth, maintenance, adaptation, treatment and conversion.

Competency Standard

7.1.1. Demonstrate an understanding of plant and animal production processes by designing improvements to existing processes.

7.1.2. Demonstrate an understanding of how biochemical technology affects medicine by designing a solution to a simple question.

7.1.3. Demonstrate an understanding of how biochemical technology affects waste products by designing a solution that will result in reduced waste.

7.1.4. Demonstrate various methods of biochemical conversion.

8. **Inquiry**

Content Standard

8.1. Scientific research elements of problem solving.

Competency Standard

8.1.1. Generate questions that can be studied in science.

8.1.2. Evaluate the appropriateness of scientific questions.

8.1.3. Design an investigation with adequate controls and limited variables to investigate a question.

8.1.4. Conduct a multiple step experiment.

8.1.5. Organize experimental information using a variety of analytic methods.

8.1.6. Judge the significance of experimental information in answering scientific questions.

8.1.7. Suggest additional steps that might be done experimentally.

Content Standard

8.2. Nature of scientific and technological knowledge.

Competency Standard

8.2.1. Compare and contrast scientific theories and beliefs.

8.2.2. Know that science is limited to the study of concrete aspects of the world and the universe.

8.2.3. Evaluate how new information can change existing theories and practice.