

Biology Performance Standards

Two-Semester Course

Prerequisite: Successful completion of both semesters of Biophysical Science I.

First year Biology will include a study of introductory ecology, zoology, botany, physiology, anatomy, genetics and evolution. Topics covered in cellular biology include mitosis, meiosis, DNA, diffusion, photosynthesis and respiration.

Laboratory work is an important aspect of this course.

A-1 Science as Inquiry and Process

SA Students develop an understanding of the processes and applications of scientific inquiry.

SA 1 Students develop an understanding of the processes of science used to investigate problems, design and conduct repeatable scientific investigations, and defend scientific arguments.

SA 2 Students develop an understanding that the processes of science require integrity, logical reasoning, skepticism, openness, communication, and peer review.

SA 3 Students develop an understanding that culture, local knowledge, history, and interaction with the environment contribute to the development of scientific knowledge, and that local application provide opportunity for understanding scientific concepts and global issues.

The student demonstrates an understanding of the processes of science by:

[10] SA1.1 asking questions, predicting, observing, describing, measuring, classifying, making generalizations, analyzing data, developing models, inferring, and communicating.

[10] SA 1.2 reviewing pertinent literature, hypothesizing, making qualitative and quantitative observations, controlling experimental variables, analyzing data statistically (i.e., mean, median, mode), and using this information to draw conclusions, compare results to others, suggest further experimentation, and apply student's conclusion to other problem (L)

The student demonstrates an understanding of the attitudes and approaches to scientific inquiry by

[10] SA2.1 examining methodology and conclusions to identify bias and determining if evidence logically supports the conclusions

B1- Concepts of Physical Science

The student demonstrates an understanding of the structure and properties of matter by

[10] SB1.1 using the periodic table to describe atoms in terms of their base components (i.e., protons, neutrons, electrons)

The student demonstrates an understanding of the interactions between matter and energy and the effects of these interactions on systems by

[10] SB3.1 describing the behavior of electrons in chemical bonding

C1- Concepts of Life Science

SC Students develop an understanding of the concepts, models, theories, facts, evidence, systems, and processes of life science.

SC1 Students develop an understanding of how science explains changes in life forms over time, including genetics, heredity, the process of natural science, and biological evolution.

SC2 Student develop and understanding of the structure, function, behavior, development, life cycle, and diversity of living organisms.

SC3 Students develop an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy.

The student demonstrates an understanding of how science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution by

[9] SC1.1 recognizing that all organisms have chromosomes made of DNA and that DNA determines traits

[9] SC1.2 using probabilities to recognize patterns of inheritance (e.g., Punnett Squares)

[10] SC1.2 explaining how the processes of natural selection can cause speciation and extinction

[10] SC1.3 examining issues related to genetics

The student demonstrates an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms by

[10] SC2.1 describing the structure-function relationship

[10] SC2.2 explaining that cells have specialized structures in which chemical reactions occur

[10] SC2.3 explaining functions of organs of major systems (i.e., respiratory, digestive, circulatory, reproductive, nervous, musculoskeletal, and excretory)

[10] SC2.4 tracing the pathways of the digestive, circulatory and excretory systems

The student demonstrates an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy by

[10] SC3.1 relating the carbon cycle to global climate change

[10] SC3.2 exploring ecological relationships (e.g., competition, niche, feeding relationships, symbiosis)

E1- Science and Technology

SE Students develop an understanding the relationships among science, technology, and society.

SE1 Students develop and understanding of how scientific knowledge and technology are used in making decisions about issues, innovations, responses to problems and everyday events.

SE2 Students develop an understanding that solving problems involves different ways of thinking, perspectives, and curiosity that leads to exploration of multiple paths that are analyzed using scientific, technological, and social merits.

SE3 Students develop an understanding of how scientific discoveries and technological innovations affect and are affected by our lives and cultures.

The student demonstrates an understanding of how to integrate scientific knowledge and technology to address problems by

[10] SE1.1 identifying that progress in science and invention is highly interrelated to what else is happening in society

The student demonstrates an understanding that solving problems involves different ways of thinking by

[10] SE2.1 questioning, researching, modeling, simulating, and testing multiple solutions to a problem

G1-History and Nature of Science

SG Students develop an understanding of the history and nature of science

SG 1 Students develop an understanding that historical perspectives of scientific explanations demonstrate that scientific knowledge changes over time, building on prior knowledge.

SG2 Students develop an understanding that the advancement of scientific knowledge embraces innovation and requires empirical evidence, repeatable investigations, logical arguments, and critical review in striving for the best possible explanations of the natural world.

SG3 Students develop and understanding that scientific knowledge is ongoing and subject to change as new evidence becomes available through experimental and/or observational confirmation(s).

SG4 Students develop an understanding that advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base.

The student demonstrates an understanding of the bases of the advancement of scientific knowledge by

[10] SG2.1 using an account of an event to recognize the processes of science used by historically significant scientists

The student demonstrates an understanding that scientific knowledge is ongoing and subject to change by

[10] SG3.1 using experimental or observational data to evaluate a hypothesis

The student demonstrates an understanding that advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base by

[10] SG4.1 recognizing the role of these factors on scientific advancements