

GOAL 1: SKILLS AND PROCESSES FOR BIOLOGY ASSESSMENT

The student will demonstrate ways of thinking and acting inherent in the practice of science. The student will use the language and instruments of science to collect, organize, interpret, calculate, and communicate information.

1. ***Expectation: The student will explain why curiosity, honesty, openness, and skepticism are highly regarded in science.***

Assessment Limits/Indicators

- (1) The student will recognize that real problems have more than one solution and decisions to accept one solution over another are made on the basis of many issues.
- (2) The student will modify or affirm scientific ideas according to accumulated evidence.
- (3) The student will critique arguments that are based on faulty, misleading data or on the incomplete use of numbers.
- (4) The student will recognize data that are biased.
- (5) The student will explain factors that produce biased data (incomplete data, using data inappropriately, conflicts of interest, etc.).

2. ***Expectation: The student will pose scientific questions and suggest investigative approaches to provide answers to questions.***

Assessment Limits/Indicators

- (1) The student will identify meaningful, answerable scientific questions.
- (2)^{NTB} The student will pose meaningful answerable scientific questions.
- (3) The student will formulate a working hypothesis.
- (4)^{NTB} The student will test a working hypothesis.
- (5) The student will select appropriate instruments and materials to conduct an investigation.
- (6) The student will identify appropriate methods for conducting an investigation (independent and dependent variables, proper controls, repeat trials, appropriate sample size, etc.).
- (7) The student will use relationships discovered in the lab to explain phenomena observed outside the laboratory.
- (8) The student will defend the need for verifiable data.

3. ***Expectation:*** *The student will carry out scientific investigations effectively and employ the instruments, systems of measurement, and materials of science appropriately.*

Assessment Limits/Indicators

- (1)^{NTB} The student will develop and demonstrate skills in using lab and field equipment to perform investigative techniques.
- (2) The student will recognize safe laboratory procedures.
- (3)^{NTB} The student will demonstrate safe handling of the chemicals and materials of science.
- (4)^{NTB} The student will learn the use of new instruments and equipment by following instructions in a manual or from oral direction.

4. ***Expectation:*** *The student will demonstrate that data analysis is a vital aspect of the process of scientific inquiry and communication.*

Assessment Limits/Indicators

- (1) The student will organize data appropriately using techniques such as tables, graphs, and webs. (for graphs: axes labeled with appropriate quantities, appropriate units on axes, axes labeled with appropriate intervals, independent and dependent variables on correct axes, appropriate title)
- (2) The student will analyze data to make predictions, decisions, or draw conclusions.
- (3) The student will use experimental data from various investigators to validate results.
- (4) The student will determine the relationships between quantities and develop the mathematical model that describes these relationships.
- (5) The student will check graphs to determine that they do not misrepresent results.
- (6) The student will describe trends revealed by data.
- (7) The student will determine the sources of error that limit the accuracy or precision of experimental results.
- (8)^{NTB} The student will use models and computer simulations to extend his/her understanding of scientific concepts.
- (9) The student will use analyzed data to confirm, modify, or reject a hypothesis.

5. ***Expectation: The student will use appropriate methods for communicating in writing and orally the processes and results of scientific investigation.***

Assessment Limits/Indicators

- (1) The student will demonstrate the ability to summarize data (measurements/observations).
- (2) The student will explain scientific concepts and processes through drawing, writing, and/or oral communication.
- (3)^{NTB} The student will use computers and/or graphing calculators to produce the visual materials (tables, graphs, and spreadsheets) that will be used for communicating results.
- (4) The student will use tables, graphs, and displays to support arguments and claims in both written and oral communication.
- (5) The student will create and/or interpret graphics. (scale drawings, photographs, digital images, field of view, etc.)
- (6) The student will read a technical selection and interpret it appropriately.
- (7) The student will use, explain, and/or construct various classification systems.
- (8) The student will describe similarities and differences when explaining concepts and/or principles.
- (9) The student will communicate conclusions derived through a synthesis of ideas.

6. ***Expectation: The student will use mathematical processes.***

Assessment Limits/Indicators

- (1) The student will use ratio and proportion in appropriate situations to solve problems.
- (2)^{NTB} The student will use computers and/or graphing calculators to perform calculations for tables, graphs, or spreadsheets.
- (3) The student will express and/or compare small and large quantities using scientific notation and relative order of magnitude.
- (4) The student will manipulate quantities and/or numerical values in algebraic equations.
- (5) The student will judge the reasonableness of an answer

7. ***Expectation: The student will show that connections exist both within the various fields of science and among science and other disciplines including mathematics, social studies, language arts, fine arts, and technology.***

Assessment Limits/Indicators

- (1) The student will apply the skills, processes and concepts of biology, chemistry, physics, or earth science to societal issues.
- (2) The student will identify and evaluate the impact of scientific ideas and/or advancements in technology on society.
- (3)^{NTB} The student will describe the role of science in the development of literature, art, and music.
- (4)^{NTB} The student will recognize mathematics as an integral part of the scientific process.
- (5)^{NTB} The student will investigate career possibilities in the various areas of science.
- (6) The student will explain how development of scientific knowledge leads to the creation of new technology and how technological advances allow for additional scientific accomplishments.