

Important Concepts	Alaska Science Content Standard C2:
Biodiversity	Students develop an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms.
9-12 Level	

#### Grade Level Expectations:

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

**[9] SC2.1** describing and comparing the characteristics of phyla/divisions from each kingdom

**[9] SC2.3** stating the function of major physiological systems (i.e., circulatory, excretory, digestive, respiratory, reproductive, nervous, immune, endocrine, musculoskeletal, and integumentary)

**[10] SC2.1** describing the structure-function relationship (e.g., joints, lungs)

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

**[10] SC2.3** explaining the 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

**[11] SC2.1** describing the structure-function relationship\*

**[11] SC2.2** describing the learned behaviors (e.g., classical conditioning, imprinting, trial and error) that are utilized by living organisms to meet the requirements of life

**[11] SC2.3** describing the functions and interdependencies of the organs within the immune system and within the endocrine system

According to AAAS's Benchmarks for Science Literacy\*, some of the things that students should know and understand by the end of twelfth grade are:

The degree of relatedness between organisms or species can be estimated from the similarity of their DNA sequences, which often closely match their classification based on anatomical similarities.

A classification system is a framework created by scientists for describing the vast diversity of organisms, indicating the degree of relatedness between organisms, and framing research questions.

- Every cell is covered by a membrane that controls what can enter and leave the cell.
- Within the cells are specialized parts for the transport of materials, energy capture and release, protein building, waste disposal, passing information, and even movement.
- In addition to the basic cellular functions common to all cells, most cells in multicellular organisms perform some special functions that others do not.
- The work of the cell is carried out by the many different types of molecules it assembles, mostly proteins. Protein molecules are long, usually folded chains made from 20 different kinds of amino acid molecules. The function of each protein molecule depends on its specific sequence of amino acids and its shape. The shape of the chain is a consequence of attractions between its parts.
- Before a cell divides, the instructions are duplicated so that each of the two new cells gets all the necessary information for carrying on.
- A living cell is composed of a small number of chemical elements mainly carbon, hydrogen, nitrogen, oxygen, phosphorous, and sulfur. Carbon, because of its small size and four available

\*Project 2061, American Association for the Advancement of Science, Benchmarks for Science Literacy. New York: Oxford University Press, 1993.

bonding electrons, can join to other carbon atoms in chains and rings to form large and complex molecules.

- Communication between cells is required to coordinate their diverse activities. Cells may secrete molecules that spread locally to nearby cells or that are carried in the bloodstream to cells throughout the body. Nerve cells transmit electrochemical signals that carry information much more rapidly than is possible by diffusion or blood flow.
- Some drugs mimic or block the molecules involved in communication between cells and therefore affect operations of the brain and body.
- The human body is a complex system of cells, most of which are grouped into organ systems that have specialized functions. These systems can best be understood in terms of the essential functions they serve for the organism: deriving energy from food, protection against injury, internal coordination, and reproduction.