

Unit 3 Cell Structure and Function

Content Area: **Science**
Course(s): **Biology CP, Biology Honors, STEM Biology Honors**
Time Period: **October**
Length: **4 weeks**
Status: **Published**

Transfer Skills

Living organisms are composed of cellular units that carry out functions required for life.

As this unit is taught, the NJ Biology Model Curriculum should be referenced as described below.

How do the structures of organisms enable life's functions? Students investigate explanations for the structure and function of cells as the basic units of life, the hierarchical systems of organisms, and the role of specialized cells for maintenance and growth. Students demonstrate understanding of how systems of cells function together to support the life processes. Students demonstrate their understanding through critical reading, using models, and conducting investigations. The crosscutting concepts of structure and function, matter and energy, and systems and system models in organisms are called out as organizing concepts. (p. 2, Life Science Topics Storyline).

Enduring Understandings

Big Idea: Living organisms are composed of cellular units that carry out functions required for life.

- Living systems demonstrate the complementary nature of structure and function
- A cell is the basic unit of life: the processes that occur at the cellular level provide the energy and basic structure organisms need to survive
- Cellular function is maintained through the regulation of cellular processes in response to internal and external environmental conditions
- There is a relationship between the organization of cells into tissues and the organization of tissues into organs
- Cells are uniquely adapted to perform specific functions within a multicellular organism

Essential Questions

- What is the essential role of each organelle within a cell?
- How can microscopes be used to identify and compare cell structures?
- How do cells maintain conditions necessary for survival in response to changing environments?
- How does the unique structure of a cell relate to its function in a living thing?

Content

Chapter 7

Vocabulary:

- **prokaryote**
- **eukaryote**
- **compound light microscope**
- **homeostasis**
- **passive transport**
- **diffusion**
- **osmosis**
- **facilitated diffusion**
- **active transport**
- **ion pumps**
- **endocytosis**
- **exocytosis**
- **cell specialization**
- **levels of organization**

Skills

- Distinguish between prokaryotic and eukaryotic cells
- Describe the structure and function of cell organelles
- Explain how the fundamental life processes of organisms depend on a variety of chemical reactions that occur in specialized areas of the organism's cells
- Use a compound light microscope to compare and contrast cell structures between prokaryotic and eukaryotic cells and animal and plant cells
- Describe the structure and function of the components of the cell membrane: phospholipids, proteins, and carbohydrates
- Compare passive and active transport across the cell membrane
- Model how processes are regulated both internally and externally by environments in which cells exist
- Model how cells are enclosed within semi-permeable membranes that regulate their interaction with their surroundings, including the transport of materials into and out of the cell
- Describe the relationships within multi-cellular organisms, where cells perform specialized functions as parts of sub-systems (e.g., tissues, organs, and organ systems), which work together to maintain optimum conditions for the benefit of the whole organism

Resources

Standards

LA.9-10.CCSS.ELA-Literacy.CCRA.R.1	Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
LA.9-10.CCSS.ELA-Literacy.CCRA.R.2	Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
LA.9-10.CCSS.ELA-Literacy.CCRA.R.4	Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.
LA.9-10.CCSS.ELA-Literacy.CCRA.R.7	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
SCI.9-12.5.1.12	All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.
SCI.9-12.5.1.12.A.3	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
SCI.9-12.5.1.12.C	Scientific knowledge builds on itself over time.
SCI.9-12.5.1.12.C.1	Reflect on and revise understandings as new evidence emerges.
SCI.9-12.5.1.12.C.2	Use data representations and new models to revise predictions and explanations.
SCI.9-12.5.1.12.D	The growth of scientific knowledge involves critique and communication, which are social practices that are governed by a core set of values and norms.
SCI.9-12.5.1.12.D.1	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
SCI.9-12.5.1.12.D.2	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
SCI.9-12.5.3.12	All students will understand that life science principles are powerful conceptual tools for making sense of the complexity, diversity, and interconnectedness of life on Earth. Order in natural systems arises in accordance with rules that govern the physical world, and the order of natural systems can be modeled and predicted through the use of mathematics.
SCI.9-12.5.3.12.A.3	Predict a cell's response in a given set of environmental conditions.
SCI.9-12.5.3.12.A.5	Describe modern applications of the regulation of cell differentiation and analyze the benefits and risks (e.g., stem cells, sex determination).
CCSS.ELA-Literacy.RH.9-10	Reading
CCSS.ELA-Literacy.RH.9-10.2	Determine the central ideas or information of a primary or secondary source; provide an accurate summary of how key events or ideas develop over the course of the text.
CCSS.ELA-Literacy.RH.9-10.3	Analyze in detail a series of events described in a text; determine whether earlier events caused later ones or simply preceded them.
CCSS.ELA-Literacy.RH.9-10.4	Determine the meaning of words and phrases as they are used in a text, including vocabulary describing political, social, or economic aspects of history/social studies.
CCSS.ELA-Literacy.RH.9-10.7	Integrate quantitative or technical analysis (e.g., charts, research data) with qualitative analysis in print or digital text.

CCSS.ELA-Literacy.WHST.9-10	Writing
CCSS.ELA-Literacy.WHST.9-10.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
CCSS.ELA-Literacy.WHST.9-10.2.a	Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
CCSS.ELA-Literacy.WHST.9-10.2.e	Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
CCSS.ELA-Literacy.WHST.9-10.2.f	Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).
	Craft and Structure