

02_Metabolism and Cellular Transport

Content Area: **Science**
Course(s):
Time Period: **Full Year**
Length: **3-4 weeks**
Status: **Published**

General Overview, Course Description or Course Philosophy

Biology focuses on the diversity, complexity, and interdependence of life on Earth. Students will develop an understanding of how organisms evolve, reproduce, and adapt to their environments. This will include an exploration of how to relate the structure and function of molecules to their role in cell biology and metabolism. Further understanding of evolution and reproduction will be explored through the science of genetics. Knowledge of biodiversity and adaptation will be illustrated through the science of ecology.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

- Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
- Systems of specialized cells within organisms help them perform the essential functions of life.
- Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.
- Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis

CONTENT AREA STANDARDS

SCI.HS-LS1-3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
SCI.HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

MA.K-12.4	Model with mathematics.
MA.F-IF.C.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
LA.W.9-10.2	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
LA.W.9-10.9	Draw evidence from literary or nonfiction informational texts to support analysis, reflection, and research.

STUDENT LEARNING TARGETS

Declarative Knowledge

Students will understand that:

- Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.
- Relevant parts (e.g., organ system, organs, and their component tissues) and processes (e.g., transport of fluids, motion) of body systems in multicellular organisms interact to maintain homeostasis.
- Feedback (negative or positive) can stabilize or destabilize a system.
- Feedback mechanisms maintain homeostasis.

Procedural Knowledge

Students will be able to:

- Develop a model in which they identify and describe* the relevant parts (e.g., organ system, organs, and their component tissues).
- In the model, students describe the relationships between components, including:
 - The functions of at least two major body systems in terms of contributions to overall function of an organism
- Use the model to illustrate how the interaction between systems provides specific functions in multicellular organisms.
- Develop an investigation plan and describe the data that will be collected and the evidence to be derived from the data, including:
 - Changes within a chosen range in the external environment of a living system.
 - Responses of a living system that would stabilize and maintain the system's internal conditions (homeostasis), even though external conditions change, thus establishing the positive or negative feedback mechanism
- In the investigation plan, students describe:
 - How the change in the external environment is to be measured or identified.
 - How the response of the living system will be measured or identified.
- Collect and record changes in the external environment and organism responses as a function of time.
- Students evaluate their investigation, including:
 - Assessment of the accuracy and precision of the data, as well as limitations of the investigation, and make suggestions for refinement.

EVIDENCE OF LEARNING

Formative Assessments

- Checks for understanding during lesson.
- Do Now activities.
- Student-centered questioning and discussion that is facilitated by instructor.
- Exit Tickets.

Summative Assessments

- Exams/Unit Exams.
- Quizzes.
- Laboratory Activities.

RESOURCES (Instructional, Supplemental, Intervention Materials)

[Miller & Levine Biology Textbook](#)

- Unit 3 - Cells
 - Chapter 8 - Life is Cellular
 - Case Study: *What's happening to me?*
 - Interactivity: *Build a Cell*
 - Quick Lab: *How Can You Make a Model of a Cell?*
 - Exploration Lab: *Detecting Diffusion.*
 - Interactivity: *Osmosis.*
 - Animation: *Active Transport.*
 - Interactivity: *Cell Differentiation and Specialization.*
 - Analyzing Data: *Mitochondria in a Mouse.*
 - Interactivity: *Levels of Organization.*
 - Video: *Cystic Fibrosis.*

POGIL Biology

- Membrane Structure and Function
- Transport in Cells

[Brainpop](#)

[NSTA](#)

[Data Nuggets](#)

[Online Resources](#)

INTERDISCIPLINARY CONNECTIONS

ELA/Literacy

Mathematics

Technology

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.