Unit 2: Cellular Processes and Homeostasis

Content Area: **Template**
Course(s):
Time Period:
Length:
Status: **Published**

State Mandated Topics Addressed in this Unit

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N/A	N/A

Cellular Processes and Homeostasis (~5 weeks)

Learning Objectives

- Cell Structure and Function
- Compare cell communication processes in different types of organisms
- Construct models comparing key differences between prokaryotic vs. eukaryotic cell structure and differentiate between plant and animal cells.
- Contrast the physical and physiological processes by which materials are transported across cell membranes (passive vs. active transport) and illustrate, with specific examples, how a cell uses diffusion and active transport to maintain a stable internal environment.
- Demonstrate Proper Microscope Techniques
- Describe the cell membrane's role in cell transport and cell-to-cell communication to allow for the overall maintenance of organism homeostasis.
- Describe the function and characteristics of enzymes and cofactors and explain how enzymatic activity is affected by such factors as the amount of enzyme and substrate present, temperature, pH, and the presence of inhibitors.
- Describe, locate, and list the functions of the principal organelles and label them on a diagram or photomicrograph.
- Discuss the importance of the cell membrane and explain how the concept of selective permeability is tied to the membrane structure and function.
- Enzymes and Metabolism
- Explain how signal pathways mediate gene expression and how this process can ultimately affect gene expression and protein production.
- Investigate enzyme structure and function, and the relationship between enzymes and energy.
- Review basic cellular components focusing on structure and function of cells and their evolution.
- State the first and second laws of thermodynamics and discuss their application to biology and how evolution conforms to, and does not violate, these laws.
- The Cell Membrane, Cell Transport and Cell Communication

- Trace the flow of energy from the sun through the biological world.
- Understand the basic timeline of the evolution of life as it pertains to cells and describe the theory of endosymbiosis in the origin of eukaryotic cells.

Essential Skills

- 1.A.3
- 1.A.4
- 1.B.1
- 1.D.2
- 2.A.1
- 2.A.3
- 2.B.1
- 2.B.2
- 2.B.3
- 3.B.2
- 3.D.1
- 3.D.2
- 3.D.3
- 4.A.2
- 4.B.1
- 4.B.2
- 4.C.1
- Big Idea 1
- Big Idea 2
- Big Idea 3
- Big Idea 4
- Science Practice 1
- Science Practice 2
- Science Practice 3
- Science Practice 4
- Science Practice 5
- Science Practice 6
- Science Practice 7

Standards

Instructional Tasks/Activities

Please note: Some activities, labs, and/or projects are subject to change, activity with numbers in parentheses indicates AP Biology required lab.

- Calculate surface-to-volume ratios in comparing cells of different sizes
- Case Study: My Dog is Broken! A Case Study in Cell Signaling
- Connect Modules: Chapter 6: Energy and Metabolism and Chapter 9 Cell Communication
- Diagram the cell membrane and its associated proteins; characterize membrane-bound receptors and describe their function in the cell signaling pathway.
- Diffusion and Osmosis Inquiry Lab (4)
- Enzyme Clay Models: students build models using clay to illustrate an enzyme/substrate complex, the interaction of a competitive inhibitor, and the interaction of a noncompetitive inhibitor.
- Given concentrations and membrane characteristics, students predict the direction of diffusion of solutes and solvents across differentially permeable membranes.
- Microscope Lab- practice proper microscope use and view, sketch and analyze different types of cells and their corresponding structures.
- Peroxidase Enzyme Activity Advanced Inquiry Lab (13)
- Practice Free Response questions from previous AP Exams on Cell Structure, Cell Transport and Cell Signaling
- Solve simple problems involving osmosis. For example, predict whether cells will swell or shrink under various osmotic (hypotonic, hypertonic, isotonic) conditions.
- Student Mini Poster Activity: Relating Medical Problems to Organelle Malfunctions- students are presented with various medical scenarios and have to determine which organelle is malfunctioning and causing patient symptoms.
- Student Skit/Role Play cell to cell communication- in small groups students script and act out in front of the class a skit modeling the mechanism of cell to cell communication.
- Summative Assessment: Chapter 4, 5 Test, Chapter 6 Test, and Chapter 9 Test
- Toothpickase Activity
- Web Activity using “Cells alive”: Independent Virtual Tour of Cells

Assessment Procedure

- Classroom Total Participation Technique
- Classwork
- DBQ
- Essay
- Exit Ticket/Entrance Ticket/Do Now
- Journal / Student Reflection
- Kahoot
- Other named in lesson
- Peer Review
- Performance

- Problem Correction
- Project
- Quiz
- Rubric
- Teacher Collected Data
- Test
- Worksheet

Recommended Technology Activities

- Appropriate Content Specific Online Resource
- Chromebook
- Copy/Paste Content Specific Link Here
- Copy/Paste Content Specific Link Here
- Copy/Paste Content Specific Link Here
- Gimkit
- GoGuardian
- Google Classroom
- Google Docs
- Google Forms
- Google Slides
- Kahoot
- MagicSchool AI
- Other- Specified in Lesson
- Quiziz
- Screencastify

Accommodations & Modifications & Differentiation

Accommodations and Modifications should be used to meet individual needs. Their IEP and 504 plans should be used in addition to the following suggestions.

Gifted and Talented

- Compare & Contrast
- Conferencing
- Debates
- Jigsaw

- Peer Partner Learning
- Problem Solving
- Structured Controversy
- Think, Pair, Share
- Tutorial Groups

Instruction/Materials

- alter format of materials (type/highlight, etc.)
- color code materials
- eliminate answers
- extended time
- extended time
- large print
- modified quiz
- modified test
- Modify Assignments as Needed
- Modify/Repeat/Model directions
- necessary assignments only
- Other (specify in plans)
- other- named in lesson
- provide assistance and cues for transitions
- provide daily assignment list
- read class materials orally
- reduce work load
- shorten assignments
- study guide/outline
- utilize multi-sensory modes to reinforce instruction

Environment

- alter physical room environment
- assign peer tutors/work buddies/note takers
- assign preferential seating
- individualized instruction/small group
- modify student schedule (Describe)
- other- please specify in plans
- provide desktop list/formula

Honors Modifications

Resources

- Resource 1
- Resource 2
- Resource 3
- Resource 4
- Resource 5