Honors Biology - Unit 2 - The Cell: Structures, Functions, and Feedback

Unit Focus

Students will explore the cellular processes that govern organisms. Beginning with case studies that involve errors in cell functions, students will uncover basic cell types, organelles, and how the molecular structure of the cell membrane allows material to pass into and out of the cell. Students will use microscopes to examine cellular structures, compare and contrast cell types. The levels of organization and the organization of cells into tissues, organs, systems and organisms will allow students to go from microscopic to macroscopic focus. Lab experiments will help them visualize the movement of water into and out of the cell as it works to maintain homeostasis. Ultimately, students will return to the analysis of case studies as they apply their understanding of cell structure and function to scenarios that people frequently experience that are part of feedback mechanisms controlled by cell processes.

Stage 1: Desired Results - Key Understandings

Standard(s)

Next Generation Science Standards
Performance Expectations: High School Life Sciences

- Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. (HS-LS1-2)

Next Generation Science Standards (DCI)
Science: 9

- Systems of specialized cells within organisms help them perform the essential functions of life. (LS1.9.A1)
- 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. (LS1.9.A3)
- Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (LS1.9.A4)

Madison Public Schools Profile of a Graduate

- Analyzing: Examining information/data/ evidence from multiple sources to identify possible underlying assumptions, patterns, and relationships in order to make inferences. (POG.1.2)
- Product Creation: Effectively use a medium to communicate important information. (POG.3.2)

Transfer

Students will be able to independently use their learning to...
T1 Make observations and ask questions to define a problem based on prior knowledge and curiosity that stimulates further exploration, analysis, and discovery.
T2 Use the scientific process to generate evidence that addresses the original questions.

Meaning

Understanding(s)

Students will understand that...
U1 The levels of organization in an organism allow the organisms to perform specific functions necessary for life.
U2 Cells exchange materials with their environment.
U3 The processes of photosynthesis and cellular respiration provide the molecules necessary for energy storage and use in organisms.
U4 All cells have DNA, which directs the creation of the proteins necessary for functioning of the cell and organism.
U5 Feedback mechanisms help organisms respond to changing environments by maintaining homeostasis.

Essential Question(s)

Students will keep considering...
Q1 How is life organized?
Q2 How does structure relate to function?
Q3 How does the body regulate itself?
Q4 How do the functions of organelles contribute to homeostasis and the proper functioning of the cell.

Acquisition of Knowledge and Skill

Knowledge

Students will know...
K1 A cell is the smallest unit of life.
K2 Each organelle perform a different and necessary function for the cell.

Skill(s)

Students will be skilled at...
S1 Analyze and explain the mechanisms causing a symptom or disease in an individual.

Stage 1: Desired Results - Key Understandings		
	K3 The structures of various cell types differ based on their function. **K4** Cells need to be small in size so that they can efficiently move materials into and out of the cell and maintain homeostasis. **K5** Homeostasis is maintaining a constant internal balance and is crucial for proper functioning of organ systems and organisms and include feedback loops. **K6** Feedback loops help to maintain homeostasis so organisms can function properly. **K7** The cell membrane is a crucial part of maintaining homeostasis through feedback loops. **K8** The molecular make-up of the cell membrane determines what materials can enter and leave the cell. **K9** Passive transport doesn't require energy (ATP) to function. **K10** Active transport requires energy to function. **K11** Vocabulary: ATP, ADP, diffusion, osmosis, active transport, passive transport, aerobic respiration, anaerobic respiration, chromosomes, nucleotide, phospholipid bilayer, protein channels, pumps, ions, action potential, homeostasis, feedback loops	**S2** Apply concepts from Unit 1, Biochemistry, to explain how the cell membrane plays a role in feedback loops to maintain homeostasis. **S3** Explain how the function of organelles contribute to homeostasis and the proper functioning of the cell.