Marietta City Schools

2024-2025 District Unit Planner

Science Grade 7 Advanced Studies

Unit title	*Cells, Cell Processes, and Human Body (Unit 2)*	**MYP year**	*2*	**Unit duration (hrs)**	*45 Hours*

Mastering Content and Skills through INQUIRY (Establishing the purpose of the Unit): ***What will students learn?***

Standards
<u>GSE Standards</u> **S7L2. Obtain, evaluate, and communicate information to describe how cell structures, cells, tissues, organs, and organ systems interact to maintain the basic needs of organisms.** a. Develop a model and construct an explanation of how cell structures (specifically the nucleus, cytoplasm, cell membrane, cell wall, chloroplasts, lysosome, and mitochondria) contribute to the function of the cell as a system in obtaining nutrients in order to grow, reproduce, make needed materials, and process waste. (Clarification statement: The intent is for students to demonstrate how the component structures of the cell interact and work together to allow the cell as a whole to carry out various processes. Additional structures, beyond those listed, will be addressed in high school Biology.) b. Develop and use a conceptual model of how cells are organized into tissues, tissues into organs, organs into systems, and systems into organisms. c. Construct an argument that systems of the body (Cardiovascular, Excretory, Digestive, Respiratory, Muscular, Nervous, and Immune) interact with one another to carry out life processes. (Clarification statement: The emphasis is not on learning individual structures and functions associated with each system, but on how systems interact to support life processes.) **Prior Student Knowledge: (REFLECTION – PRIOR TO TEACHING THE UNIT)** In fifth grade, students should have mastered the following: S5L3. Obtain, evaluate, and communicate information to compare and contrast the parts of plant and animal cells. a. Gather evidence by utilizing technology tools to support a claim that plants and animals are comprised of cells too small to be seen without magnification. b. Develop a model to identify and label parts of a plant cell (membrane, wall, cytoplasm, nucleus, chloroplasts) and of an animal cell (membrane, cytoplasm, and nucleus). c. Construct an explanation that differentiates between the structure of plant and animal cells **<u>MCS Gifted Standards K-12</u>** MCS.Gifted.S1C. Gather, organize, analyze, evaluate, and synthesize data from multiple sources for research applications.

MCS.Gifted.S4A. Develop skills and techniques associated with effective verbal and non-verbal communication, adjusting for a given audience or task.

MCS.Gifted.S4B. Recognize and examine the value of others strengths, thoughts, ideas, and feelings during collaboration.

MCS.Gifted.S4C. Establish a common goal utilizing strengths of each group member.

MCS.Gifted.S4E. Use a variety of multi-media and innovative technologies as tools to effectively communicate the individual or collaborative group work.

MCS.Gifted.S5C. Develop and practice critical analysis in judgment of one's actions, feelings, and thoughts.

MCS.Gifted.S6A. Set appropriately high standards for work and behavior.

MCS.Gifted.S6C. Persevere in the face of obstacles.

Concepts/Skills to be Mastered by Students

- Cell structure and function
- Levels of organization
- Organ systems
- Growth and development of organism
- Sexual and asexual reproduction

Key Vocabulary: (KNOWLEDGE & SKILLS)
Cells, nucleus, cytoplasm, cell membrane, cell wall, chloroplasts, lysosome, mitochondria, structure, function, mitosis, passive transport, diffusion, osmosis, active transport, endocytosis, exocytosis, photosynthesis, respiration, eukaryotic, prokaryotic, DNA, unicellular, multicellular; semi-permeable, concentration gradient, equilibrium, fermentation, homeostasis, tissue, organ, organ system, organism, cardiovascular, respiratory, heart, veins, arteries, lungs, bronchi, bronchioles, alveoli, excretory, urinary, kidneys, bladder, ureters, digestive, mechanical digestion, chemical digestion, stomach, small intestine, villi, large intestine, muscular, skeletal, smooth, cardiac, nervous, brain, spinal cord, immune, skeletal,

Year-Long Anchoring Phenomena: (LEARNING PROCESS)
Humans have the ability to positively and/or negatively impact biological and ecological systems

Unit Phenomena (LEARNING PROCESS)
How do pathogens impact the human body at the cellular and system levels?

Possible Preconceptions/Misconceptions: (REFLECTION – PRIOR TO TEACHING THE UNIT)
All cells are the same.
All cells require oxygen.
Students may not understand the concept of multicellular organisms.
Students may think that organisms grow when cells grow (get larger), instead of through cell division.
Students may confuse the functions of cell organelles.
Students may not be aware of the various processes (passive and active transport) that must occur in order for cells to function properly.
Students have difficulty analyzing and interpreting diffusion/osmosis diagrams and high/low concentrations.

Key concept	Related concept(s)	Global context
Systems and system models Systems are sets of interacting or interdependent components. Systems provide structure and order in human, natural and built environments. Systems can be static or dynamic, simple or complex	Form/structure (MYP/CCC) Function (MYP/CCC) Interaction (MYP)	**Scientific and Technical Innovation** Students will explore the natural world and its laws; the interaction between people and the natural world; how humans use their understanding of scientific principles; the impact of scientific and technological advances on communities and environments; the impact of environments on human activity; how humans adapt environments to their needs.

Statement of inquiry

Advances in science and technology have led to a greater understanding of how cellular and body systems interact to function and maintain balance within an organism.

Inquiry questions

Factual

What are the structures within a cell that allow it to function and what are their roles?
What processes does the cell undergo in order to grow, reproduce, make needed materials, and process waste?
What are the body systems found in a complex organism and what functions do they carry out?

Conceptual

Why is a cell considered to be the basic unit of life?
How does the cell act as a system in order to obtain nutrients in order to grow, reproduce, make needed materials, and process waste?
How can we use analogies to understand the function of organelles within a cell?
How are an organism's cells impacted by viral challenges (Tide Pods, water, cinnamon, inhalation of substances)?
How do the systems of the body interact and work together to support life processes?
How do processes at the cellular level support body system functions?
How can prosthetic limbs be engineered to carry out natural human body functions, and how can this be modeled?
How are other systems impacted when one body system is not functioning properly?

Debatable

What organelle is most essential to a cell's ability to function?
Which body system, if dysfunctional, would have the least impact on an organism's overall health?
When does a human become bionic?/When is a human no longer a human?
How can scientific and technical advances be used to improve medical conditions?

MYP Objectives	Assessment Tasks

*What specific MYP **objectives** will be addressed during this unit?*	***Relationship** between summative assessment task(s) and statement of inquiry:*	*List of common formative and summative assessments.*
Science: Criterion A: Knowing and Understanding i. describe scientific knowledge Criterion B: ii. outline a testable hypothesis and explain it using scientific reasoning iii. describe how to manipulate the variables, and describe how data will be collected iv. design scientific investigations Criterion C: Processing and Evaluating i. present collected and transformed data ii. interpret data and describe results using scientific reasoning Criterion D: Reflecting on the Impacts of Science iii. apply scientific language effectively Design:	SOI: Advances in science and technology have led to a greater understanding of how cellular and body systems interact to function and maintain balance within an organism. In this portion of the unit, students focus on the cell as a system and the interaction between its organelles in order for the cell to function. They demonstrate their understanding of cell structures and cell processes through a cell unit assessment which requires students to analyze and interpret how cells would be impacted if specific organelles were to malfunction. They also visualize cells and cell processes by designing and engaging in diffusion/osmosis and photosynthesis/respiration labs, in which variables are manipulated to assess their impact on system homeostasis. Students also explore the scientific and technical innovations, such as microscopes, that allow us to view cells and witness their processes, which has led to a greater understanding of the functions that need to occur in order for a cell to operate. In this portion of the unit, students focus on the interaction of body systems in carrying out an organism's life processes. Students will demonstrate their understanding of these connections through a common summative unit assessment, in which they identify the interactions that occur between systems that are necessary for complex multicellular organisms to function. Students will also explore the use of prosthetics as a scientific/technical innovation and have the opportunity to design a device to solve a medical problem that impacts multiple systems (blood vessels blocked by plaque; airways obstructed due to asthma; a stroke that kills nerve cells in the brain; weakened muscles from muscular dystrophy).	**Formative Assessment(s):** Cells Common Formative Assessment Human Body Common Formative Assessments **Summative Assessment(s):** Cells & Cell Processes Unit Assessment Paper I and Paper II (Science: A,D) Human Body Unit Assessment Paper I and Paper II (Science: A, D)

Criterion B: i. develop a design specification which outlines the success criteria for the design of a solution based on the data collected iii. present the chosen design and outline the reasons for its selection iv. develop accurate planning drawings/diagrams and outline requirements for the creation of the chosen solution Criterion C: iii. follow the plan to create the solution, which functions as intended v. present the solution as a whole Criterion D: i. explain the success of the solution against the design specification iii. describe how the solution could be improved		

Approaches to learning (ATL)
Category: Thinking **Cluster:** Critical-Thinking **Skill Indicator:** Use models and simulations to explore complex systems and issues. Gather and organize relevant information to formulate an argument.

<u>Learning Experiences</u>

Objective or Content	Learning Experiences	Personalized Learning and Differentiation
S7L2. Obtain, evaluate, and communicate information to describe how cell structures, cells, tissues, organs, and organ systems interact to maintain the basic needs of organisms. a. Develop a model and construct an explanation of how cell structures (specifically the nucleus, cytoplasm, cell membrane, cell wall, chloroplasts, lysosome, and mitochondria) contribute to the function of the cell as a system in obtaining nutrients in order to grow, reproduce, make needed materials, and process waste.	CER: How do pathogens impact the human body at the cellular and system levels? Mosa Mack Cells Lesson #1: Phenomenon + Introduction to Microscopes Mosa Mack Cells Lesson #2: The Lab Cell Analogies Observing the Impacts of Resource Availability on Yeast Respiration (Science: B,C) Lab: Diffusion/Osmosis	• Capstone Connections • Discovery Education High School Biology Science Techbook • NGSS Case Study 7: Gifted and Talented Students • Next Generation Science Standards: "All Standards, All Students • Extensions – Enrichment Tasks/Projects Task-Specific Differentiation • CER peer review and feedback • Use of Mosa Mack phenomenon for increased level of rigor • Students develop their own diffusion/osmosis investigation to include procedures; students select variables to alter • Open-ended sections embedded in lab report • Increased vocabulary instruction in context • Students select from Mosa Mack engineering design challenges
S7L2. Obtain, evaluate, and communicate information to describe how cell structures, cells, tissues, organs, and organ systems interact to maintain the basic needs of organisms. b. Develop and use a conceptual model of how cells are organized into tissues, tissues into organs, organs into systems, and systems into organisms.	CER: How do pathogens impact the human body at the cellular and system levels? Frog Dissection	
S7L2. Obtain, evaluate, and communicate information to describe how cell structures, cells, tissues, organs, and organ systems interact to maintain the basic needs of organisms. c. Construct an argument that systems of the body (Cardiovascular, Excretory, Digestive, Respiratory, Muscular, Nervous, and Immune) interact with one another to carry out life processes. (Clarification statement: The emphasis is not on learning individual	CER: How do pathogens impact the human body at the cellular and system levels? Mosa Mack Interactions of the Human Body Lesson #1: Phenomenon Mosa Mack Engineering Design Challenge: Medical Consultant Mosa Mack Interactions of the Human Body Lesson #2: System Labs Frog Dissection	

structures and functions associated with each system, but on how systems interact to support life processes.)		

Content Resources

Mosa Mack: Cells
Mosa Mack: Interactions of Body Systems
Discovery Education Grade 7 Science Techbook
Discovery Education High School Biology Science Techbook

Capstone Connections

Good Kitchen + Market
Oceanic Occupations Field Trip Reflection
Observing the Impacts of Resource Availability on Yeast Respiration (Science: B,C)
Capstone Ideas Brainstorming
Teacher Feedback on Initial Capstone Ideas
Final Capstone Idea & Submission of Anticipated Materials