

**MYP/3D Science Unit Planner**

**Marietta City Schools**

<b>Grade &amp; Course:</b> 10th Grade Biology	<b>Topic:</b> Structure & Function in Living Systems	<b>Duration:</b> 7 weeks
<b>Teachers:</b> Hunter Fisher, Heather Glazebrook, Mariah Sappington, Uswa Jadoon, Lisa Smith, Rosemary Kamau, O’Neal McRunells, Amber Carr, Zakayo Ruoro, Alvin Tremble		
<b>Narrative / Background Information</b>		
<p><b>Prior Student Knowledge: (REFLECTION – PRIOR TO TEACHING THE UNIT)</b>          Students have prior knowledge from elementary and middle school life science courses.</p> <p>Standards Covered:  <b>SB1. Obtain, evaluate, and communicate information to analyze the nature of the relationships between structures and functions in living cells.</b></p> <ul style="list-style-type: none"> <li>a. Construct an explanation of how cell structures and organelles (including nucleus, cytoplasm, cell membrane, cell wall, chloroplasts, lysosome, Golgi, endoplasmic reticulum, vacuoles, ribosomes, and mitochondria) interact as a system to maintain homeostasis.</li> <li>c. Construct arguments supported by evidence to relate the structure of macromolecules (carbohydrates, proteins, lipids, and nucleic acids) to their interactions in carrying out cellular processes. (Clarification statement: The function of proteins as enzymes is limited to a conceptual understanding.)</li> <li>d. Plan and carry out investigations to determine the role of cellular transport (e.g., active, passive, and osmosis) in maintaining homeostasis.</li> </ul> <p><b>Student need to know:</b></p> <ul style="list-style-type: none"> <li>• Types of Cells (prokaryote/eukaryote, animal/plant).</li> <li>• Cellular organelles’ structure and function (cell membrane, cell wall, chloroplast, mitochondria, nucleus, rough and smooth ER, ribosomes, golgi body, lysosomes, large vacuole).</li> <li>• Homeostasis – how the organelles work together to maintain an internal balance.</li> <li>• Macromolecules structure and function (carbohydrates, lipids, proteins, nucleic acids).</li> <li>• How enzymes speed up chemical reactions.</li> <li>• Cell membrane structure and function.</li> <li>• Types of cell transport.</li> </ul>		
<p><b>Year-Long Anchoring Phenomena: (LEARNING PROCESS)</b>          Sickle cell is a heritable genetic mutation that evolved in response to interactions in ecosystems.</p>		
<p><b>Unit Phenomena (LEARNING PROCESS)</b>          Protists have always been a challenging group to classify. An amazing variety of structure &amp; function patterns are found in these aquatic organisms.</p>		
<p><b>MYP Inquiry Statement:</b>          The structures within living things help living systems to maintain homeostasis.</p>		
<p><b>MYP Global Context:</b>          Scientific and Technical Innovation: The Biological Revolution</p>		

<p><b>Approaches to Learning Skills:</b></p> <p>COMMUNICATION: Communication Skills</p> <p>SOCIAL: Collaboration Skills</p> <p>SELF-MANAGEMENT: Organization Skills</p> <p>SELF-MANAGEMENT: Affective Skills</p> <p>SELF-MANAGEMENT: Reflection skills</p> <p>RESEARCH: Information literacy skills</p> <p>RESEARCH: Media literacy skills</p> <p>THINKING: Critical-thinking Skills</p> <p>THINKING: Creative-thinking Skills</p> <p>THINKING: Transfer skills</p> <p><b>SEP</b></p> <p>Construct explanations &amp; ask questions</p> <p>Engage in argument from evidence</p> <p>Plan &amp; carry out investigations</p> <p>Analyze and interpret data</p> <p>Develop and use models</p> <p>Obtaining, evaluating &amp; communicating information</p>	<p><b>Disciplinary Core Ideas: (KNOWLEDGE &amp; SKILLS)</b></p> <p>Characteristics of Life</p> <p>Macromolecules</p> <p>Enzymes</p> <p>Cell Structure and Organelles</p> <p>Homeostasis</p> <p>Cell Membrane and Transport</p>	<p><b>Crosscutting Concepts: (KNOWLEDGE &amp; SKILLS)</b></p> <p>Patterns (CC)- 4ab</p> <p>Structure &amp; Function (CC)- 1acde</p> <p><b>MYP Key and Related Concepts:</b></p> <ul style="list-style-type: none"> <li>• Structure and Function</li> <li>• Systems and System Models</li> </ul>
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**Possible Preconceptions/Misconceptions: (REFLECTION – PRIOR TO TEACHING THE UNIT)**

Misconceptions: Mitochondria are the “powerhouse” of the cell. A model must be a 3-D representation. Homeostasis means equilibrium- not necessarily that the environment (of the cell) is stable→ not everything in terms of solutes should be equal inside and outside the cell.

Preconceptions: Students should have a basic understanding of the differences between prokaryotic and eukaryotic cells, as well as the basic functions of the organelles. Students should understand the general idea of homeostasis and the processes that occur at cellular level to transport across the cell membrane.

**Key Vocabulary: (KNOWLEDGE & SKILLS)**

Macromolecule, Monomer/Polymer, Carbohydrate, Glucose, Monosaccharide/Polysaccharide, Lipid, Hydrophobic/ Hydrophilic, Fatty Acids, Protein, Amino Acids, Nucleic Acids, Nucleotide, DNA/RNA, Enzymes, Catalyst, pH, Eukaryotic, Prokaryotic, Multicellular, Cellulose, Phospholipid, Lipid Bilayer, Semipermeable, Selectively Permeable, Fluid Mosaic Model, Passive Transport, Active Transport, Concentration Gradient, Electrochemical Gradient, Diffusion, Osmosis, Facilitated Diffusion, Simple Diffusion, Endocytosis, Exocytosis, Sodium-Potassium Pump, Equilibrium, Homeostasis.

**Inquiry Questions:****Factual**

What are the major organelles in a cell?  
 What are the functions of each of the organelles?  
 What are the structural differences between prokaryotic and eukaryotic cells?  
 What are the 4 major classes of macromolecules, their monomers, and their functions?  
 What are the characteristics of living things?

**Conceptual**

How do cell structures interact to maintain homeostasis of the cell?  
 How do the structures of the 4 macromolecules relate to their function in cellular processes?  
 How does cell transport help cells maintain homeostasis?

**Debatable Question**

Would you recommend consumption of advertised athletic drinks such as Gatorade and PowerAid to help support homeostasis in cells?

MYP Objectives	Summative assessment	
<b>Sciences</b>  <b>Design</b>	Assessment Task:  Common Formative Assessment <ul style="list-style-type: none"> <li>● Given through Schoology. Students are given two attempts. Feedback on questions can be given from the teacher through the learning platform.</li> <li>● Questions are standard based (GSE)</li> <li>● Data is reviewed in PLC's meetings to determine what students are doing well (need extension) and what students are still struggling with (what remediation is needed)</li> </ul> Common Summative Assessments MYP C- Catalase Enzyme lab MYP B- Lactaid Design Lab MYP C- Cell Transport Lab Unit Summative Assessment MYP A x 2- short answer per part	Relationship between summative assessment task(s) and statement of inquiry:  The design lab demonstrates how the cell membrane works to maintain homeostasis in living organisms, and all living things have cell membranes.  The CFAs are check-ins to determine student progress as we move through the unit. This data informs the teacher who needs to be accelerated, who is keeping up, and who needs remediation before moving forward.  The summative assessments serve to test student knowledge of living systems in terms of structures of organisms and how they are classified based on their structure.

**Unit Objectives:**

- Living things have characteristics that distinguish them from nonliving things: growing, reproducing, consuming/eating, expelling wastes, reacting to the environment, and dying.
- Cells are made of four major macromolecules—proteins, lipids, nucleic acids and carbohydrates.
- Cells are the building blocks of living things.
- Cells can be classified into two broad categories—prokaryotic and eukaryotic.
- Eukaryotic cells can be further divided into groups based on the presence or absence of certain structures.

- Cells have parts with specific functions: the nucleus, DNA, cytoplasm, cell membrane, and cell wall.
- Microscopes are tools that allow the observation and study of very small objects such as cells.
- Cells are very small so that materials such as nutrients and wastes can be exchanged efficiently between the inside and outside of the cell.
- Cells exchange materials with their environment to maintain homeostasis.
- Models help us understand complex biological structures such as the cell.
- Cells make up a tissue, and tissues make up organs.
- Enzymes help to facilitate cellular processes in living things.

Learning Activities and Experiences	Inquiry & Obtain: (LEARNING PROCESS)	Evaluate: (LEARNING PROCESS)	Communicate: (LEARNING PROCESS)
Week 1:	<p><b>5E Lesson Plan: Characteristics of Life</b></p> <p><b>Phenomenon:</b> Can life be found or sustained on other planets such as Mars? -or- Sewer Lice Phenomenon</p> <p><b>Q: What makes things living?</b></p> <p><b>Engage: What do students know about the characteristics of life?</b></p> <p>Teacher displays a series of images and objects for students that have some “life-like” characteristics OR creates a brief station activity with these objects. Class discussion and address misconceptions.</p> <p>Characteristics of Life Stations</p>	<p><b>Mystery Organism Performance Task</b> Students will use provided texts to create a claim in response to whether their mystery entity is alive or not.</p>	<p><b>Explore: Making observations and identifying patterns regarding living organisms.</b> Teacher provides students with a variety of examples of <i>living</i> organisms to observe and generate a list of common characteristics. Observations could be collected as a whole class (using demonstrations) in lab groups, or as a station activity using group jigsaw learning. Students work in collaborative groups using the observations, ideas, and questions generated from the <b>See-Think-Wonder</b> group learning routine to create a list of what they consider to be the <u>essential</u> characteristics of living organisms.</p> <p>See-Think-Wonder Activity</p>

<p><b>Weeks 2-3</b></p>	<p><b>Phenomenon:</b> Are crickets a viable food source for humans? Should crickets be included in school lunches?</p> <p><b>Engage:</b> How North America's Largest Cricket Farm Harvests 50 Million A Week</p> <p>Groups discuss question prompts.</p> <ul style="list-style-type: none"> <li>• What makes certain foods nutritious?</li> <li>• Why should we consider adding crickets as part of our school lunches?</li> <li>• What questions do I have about consuming, digesting, and processing crickets?</li> </ul>	<p><b>Elaborate/Evaluate :</b> Identifying macronutrients found in common foods.</p> <p>Macromolecule Lab</p> <p>Students investigate how we can use indicators to identify the macronutrients found in food.</p> <p>Last Supper Activity</p> <p>Alternative similar labs : Murder Mystery</p> <p><b>Enzymes:</b> <i>Students investigate how enzymes function at different temperatures and pH levels.</i></p> <p>Enzyme Lab: Toothpickase</p> <p>Enzyme Lab: Toothpickase with virtual lab alternative</p> <p>MYP C- Catalase Enzyme lab</p> <p>MYP B- Lactaid Design Lab</p> <p>Alternative : Lactaid Enzyme Lab</p> <p><b>UNIT 1: QUIZ 1</b> Common Formative Assessment: Macromolecules and Enzymes</p> <p>Unit 1 Summative part 1 Assessment in Schoology</p>	<p><b>Explore:</b> Students use a variety of resources in order to gather evidence on the structure and function of macromolecules.</p> <p>Macromolecule Bloom Ball (Groups)</p> <p><b>Explain:</b> <i>Students will use the information researched to complete the graphic organizer.</i></p> <p>Macromolecule Graphic Organizer</p> <p><b>How do enzymes function as catalysts of biological processes?</b></p> <p><b>Engage:</b> The teacher learns what students know and care about related to the breakdown of the macronutrients found in food by asking questions about phenomena they experience (the breakdown of a saltine cracker).</p> <p><b>Explain:</b></p> <p><b>Enzyme PowerPoint Notes</b></p> <p><b>Enzyme Guided Notes</b></p> <p><i>Differentiated Notes</i> <i>Enzyme Graphic Word Bank Notes</i></p>
<p><b>Week 4:</b></p>	<p><b>Phenomenon</b> - Chloroplasts and mitochondria are similar to prokaryotic cells.</p> <p><b>Gathering</b> - Introduction of cell theory and Endosymbiosis Theory</p>	<p>Cell viewing through microscope-determine prokaryotic or eukaryotic, uni/multicellular.</p> <p>Compare and Contrast Prokaryotes and Eukaryotes Venn Diagram</p> <p>Endosymbiosis Carton Activity</p>	<p>Evidences of Endosymbiosis Theory Group Activity</p> <p>"A Theory on the Origins of Eukaryotic Cells: Mitochondria and Chloroplasts"</p>

<b>Week 5:</b>	<p><b>Phenomenon</b> - Algae is used as a source of energy in a bioreactor house.</p> <p><b>Gathering</b> - Explore cell organelles- determine structure and function.</p> <p>Plant and Animal Cell Simulation</p> <p>Explore Cell Membrane - Part I</p>	<p>Little Girl Lost on Level Activity</p> <p>Formative Kahoot 1</p> <p>Formative Kahoot 2</p> <p><b>Unit 1 Quiz 2 Common Formative: Cell Structure and Function</b></p>	<p>3D Cell Project</p> <p>or</p> <p>Plant and Animal Cell Virtual Lab</p> <p>or</p> <p>Cell organelles and Functions Visual Exploration</p>
<b>Week 6:</b>	<p><b>Phenomenon</b> - Muscle soreness occurs in humans after a long run.</p> <p><b>Gathering</b> - Explore Cell Membrane Part II &amp; Introduction to Cell Transport</p>	<p>Kahoot -2</p>	<p>MYP C- Cell Transport Lab Unit</p>
<b>Week 7: Remediation / Extension</b>	<p>Common Biology PLC selected remediation and extension activities.</p> <ol style="list-style-type: none"> <li>1. Macromolecule Review</li> <li>2. Enzyme Interactive Slides</li> <li>3. Cell Structure and Function Review</li> </ol>		
<b>Week 8</b>	<p>Test Review</p> <p>Unit 1 Review/Notebook</p>	<p>Unit 1 Summative part 2 Assessment in Schoology</p>	<p>Question Analysis - Whole Group</p>
<p><b>Resources (hyperlink to model lessons and/or resources):</b>  <a href="#">Discovery Education Science Techbook</a>  Schoology Pages</p>			

**Curriculum Unit Approval Statement**  
*Every team member is expected to read and review the unit planner and contents contained in the unit planner.*

This unit meets the rigorous review and approval process of Marietta City Schools. All components of the unit have been reviewed and approved including learning experiences, materials, resources, texts, and assessments. This unit’s components:

- Are aligned to Georgia Standards of Excellence and MYP/DP subject area guide (if applicable)
- Are aligned to the pacing of the approved Subject Group Overview
- Provide resources that are appropriate for students' grade level, subject/course level, etc.
- Provide learning experiences that prepare students for course assessments

PLCs review each learning experience using three criteria and collaborate to provide explicit and specific information.

<p><b>Criteria I: Standards Alignment:</b></p> <p><i>Learning experiences should provide alignment to the standards and the MYP subject area guide (if applicable).</i></p>	<p><b>Criteria II: Materials, Resources, and Text Complexity and Controversial Topics and Issues:</b></p> <p><i>Materials, resources, and texts are grade level and content appropriate.</i></p>	<p><b>Criteria III: Assessment Alignment:</b></p> <p><i>Since assessment drives instruction, learning experiences must align to and prepare students for regular common formative and summative assessments used to determine whether students are mastering standards-based content and ATL skills.</i></p>
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**Common Formative and Summative Assessments**

<b>Assessment Title</b>	<b>Criteria I:</b> Does the PLC have any <u>concerns</u> or <u>issues</u> regarding the <u>alignment of learning experiences, materials, and resources</u> to: <ol style="list-style-type: none"> <li>1. <b>State Standards</b></li> <li>2. <b>MYP/DP (if applicable) components</b></li> <li>3. <b>Aligned to learning experiences</b></li> </ol> Respond below with a N/A if you have no concerns or provide explicit comments related to concerns including method of resolution.	<b>Criteria II:</b> Does the PLC have any <u>concerns</u> or <u>issues</u> regarding <ol style="list-style-type: none"> <li>1. <b>Complexity of resources including text and vocabulary</b></li> <li>2. <b>Controversial topics and issues in learning experiences, materials or resources</b></li> </ol> Respond below with a N/A if you have no concerns or provide explicit comments related to concerns including method of resolution. Include the <b>specific quote(s)</b> and reference <b>page numbers</b> or <b>location</b> (ex: time in video).
<b>Formative Assessment(s):</b>	N/A	N/A
<b>Summative(s) Assessment:</b>	N/A	N/A
Plan to address issues or concerns noted:		



Learning Experiences			
Add additional rows below as needed.			
Learning Experience Title	Criteria I: Does the PLC have any <u>concerns</u> or <u>issues</u> regarding the <u>alignment of learning experiences, materials, and resources</u> to: 1. <b>State Standards</b> 2. <b>MYP/DP (if applicable) components</b>  Respond below with a N/A if you have no concerns or provide explicit comments related to concerns including method of resolution.	Criteria II: Does the PLC have any <u>concerns</u> or <u>issues</u> regarding 1. <b>Complexity of resources including text and vocabulary</b> 2. <b>Controversial topics and issues in learning experiences, materials or resources</b>  Respond below with a N/A if you have no concerns or provide explicit comments related to concerns including method of resolution. Include the <b>specific quote(s)</b> and reference <b>page numbers</b> or <b>location</b> (ex: time in video).	Criteria III: Does the PLC have any <u>concerns</u> or <u>issues</u> regarding 1. <b>Common Assessment alignment to instruction and/or standards</b>  Respond below with a N/A if you have no concerns or provide explicit comments related to concerns including method of resolution.
LE 1:	N/A	N/A	N/A
LE 2:	N/A	N/A	N/A
LE 3:	N/A	N/A	N/A
Plan to address issues or concerns noted:			

Resources listed on unit planner			
Add additional rows below as needed.			
Resources	Criteria I: Does the PLC have any <u>concerns</u> or <u>issues</u> regarding the <u>alignment of learning experiences, materials, and resources</u> to: 1. <b>State Standards</b> 2. <b>MYP/DP (if applicable) components</b>  Respond below with a N/A if you have no concerns or provide explicit comments	Criteria II: Does the PLC have any <u>concerns</u> or <u>issues</u> regarding 1. <b>Complexity of resources including text and vocabulary</b> 2. <b>Controversial topics and issues in learning experiences, materials or resources</b>  Respond below with a N/A if you have no concerns or provide explicit comments related to concerns including method of resolution.	Criteria III: Does the PLC have any <u>concerns</u> or <u>issues</u> regarding 1. <b>Common Assessment alignment to instruction and/or standards</b>  Respond below with a N/A if you have no concerns or provide explicit comments related to concerns including method of resolution.

	related to concerns including method of resolution.	Include the <b>specific quote(s)</b> and reference <b>page numbers</b> or <b>location</b> (ex: time in video).	
<b>Resource:</b>	N/A	N/A	N/A
Plan to address issues or concerns noted:			

***By typing my name below I am acknowledging that I have fully read, reviewed, listed concerns with resolutions, and approved of all contents included in the unit planner including learning experiences, materials, resources, texts, and assessments referenced on it. All other content and materials not included on the unit planner are the local school's responsibility (BOE IKB).***

Curriculum Team Signatures: Hunter Fisher, Heather Glazebrook, Mariah Sappington, Uswa Jadoon, Lisa Smith, Rosemary Kamau, O'Neal McRunells, Amber Carr, Zakayo Ruoro, Alvin Tremble