**Native American Community Academy UbD 2.0**

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| **Stage 1 Desired Results** *What are your unit objectives and outcomes?* | | |
| BIG IDEAS   * Biological systems are created and defined by the appearance   Of emergent, complex properties.   * The movement of matter and energy in a cell is essential for   Cell survival.   * Evolution drives diversity and unity of life. * Cellular communication is essential in survival of life | ***Transfer*** | |
| *Students will be able to independently use their learning to…*  Evaluate, analyze and explain how changes at the molecular and cellular level effect the dynamic homeostasis of the cell and hence, the functioning of the biological systems created by cells. | |
| ***Meaning*** | |
| UNDERSTANDINGS  *Students will understand that…*   1. Organelles function and interaction result in a diverse system to accomplish the emergent functions and properties of a cell. This includes growth, homeostasis and reproduction. 2. Movement of matter and use of energy are required to grow, reproduce and maintain checks and balances in cells and its systems. 3. Cell communication is vital for survival and function of cells which is a unit of living things. 4. Cell communication has pathways and organelles functions will determine future traits and descents. | ESSENTIAL QUESTIONS   1. Does the structure of cellular membranes effect the structure and function of the cell? How does this connect? 2. How might changes at the molecular and cellular stages affect the function of an organism and eventually an ecosystem? |
| ***Acquisition*** | |
| *As a result of this unit, students will know…*   1. The structure and function of subcellular components, interactions, essential process, for both Eukaryotic and prokaryotic cells. 2. Organisms share similarities which are evolved in cells. 3. Eukaryotic cells maintain internal membranes, which make them specialized. 4. Cell membranes are selectively permeable due to their structure. 5. A variety of molecular units provides cells with specialized functions. 6. Growth and dynamic homeostasis are maintained by constant movement of molecules across membranes: Passive transport/Active transports 7. Proper interactions within organisms create efficient way to use energy. 8. Organisms must exchange matter with environment to grow, and produce. 9. Cells communicate with each other through chemical signaling. 10. Cell communication processes share common features that reflect a shared evolutionary history. 11. Signals or pathways link signal reception with cell response. 12. Changes in signal pathways can destruct a cell and cell response. | *As a result of this unit, students will be able to…*   1. Read and evaluate complex text to gain relevant information 2. Determine central ideas 3. Able to defend textual evidence in building understanding and to support analysis, reflection, and research. 4. Students can create and use representations and models to analyze situations and solve problem quantitatively and qualitatively. 5. Student can re-express key elements of natural phenomena. 6. Student can pose scientific questions. 7. Students can look a date and justify why? 8. Students can design and plan for collecting data to answer a particular scientific question. 9. Students can then analyze data to identify patterns or relationships. 10. Students can adjust measurements or observations based on data. 11. Students can provide data sets. 12. Students can connect phenomena, and generalize and assimilate/across enduring understandings and /or big ideas. |
| COMMON CORE STATE STANDARDS  **Next Generations Science Standards:**  **Disciplinary Core Ideas**    LS1.A: Structure and Function  •Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)  •All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1) (Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)  •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. (HS-LS1-2)  •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. (HS-LS1-3)  LS1.B: Growth and Development of Organisms  •In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism. (HS-LS1-4)  LS1.C: Organization for Matter and Energy Flow in Organisms  •The process of photosynthesis converts light energy to stored chemical energy by converting carbon dioxide plus water into sugars plus released oxygen. (HS-LS1-5)  •The sugar molecules thus formed contain carbon, hydrogen, and oxygen: their hydrocarbon backbones are used to make amino acids and other carbon-based molecules that can be assembled into larger molecules (such as proteins or DNA), used for example to form new cells. (HS-LS1-6)  •As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products. (HS-LS1-6),(HS-LS1-7)  •As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another. Cellular respiration is a chemical process in which the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. Cellular respiration also releases the energy needed to maintain body temperature despite ongoing energy transfer to the surrounding environment. (HS-LS1-7)  LS3.A: Inheritance of Traits  •Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA. The instructions for forming species’ characteristics are carried in DNA. All cells in an organism have the same genetic content, but the genes used (expressed) by the cell may be regulated in different ways. Not all DNA codes for a protein; some segments of DNA are involved in regulatory or structural functions, and some have no as-yet known function. (HS-LS3-1)  LS3.B: Variation of Traits  •In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited. (HS-LS3-2)  •Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors. (HS-LS3-2),(HS-LS3-3)  LS4.A: Evidence of Common Ancestry and Diversity  •Genetic information, like the fossil record, provides evidence of evolution. DNA sequences vary among species, but there are many overlaps; in fact, the ongoing branching that produces multiple lines of descent can be inferred by comparing the DNA sequences of different organisms. Such information is also derivable from the similarities and differences in amino acid sequences and from anatomical and embryological evidence. (HS-LS4-1)  LS4.B: Natural Selection  •Natural selection occurs only if there is both (1) variation in the genetic information between organisms in a population and (2) variation in the expression of that genetic information—that is, trait variation—that leads to differences in performance among individuals. (HS-LS4-2), (HS-LS4-3)  •The traits that positively affect survival are more likely to be reproduced, and thus are more common in the population. (HS-LS4-3)  LS4.C: Adaptation  •Evolution is a consequence of the interaction of four factors: (1) the potential for a species to increase in number, (2) the genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for an environment’s limited supply of the resources that individuals need in order to survive and reproduce, and (4) the ensuing proliferation of those organisms that are better able to survive and reproduce in that environment. (HS-LS4-2)  •Natural selection leads to adaptation that is, to a population dominated by organisms that are anatomically, behaviorally, and physiologically well suited to survive and reproduce in a specific environment. That is, the differential survival and reproduction of organisms in a population that have an advantageous heritable trait leads to an increase in the proportion of individuals in future generations that have the trait and to a decrease in the proportion of individuals that do not. (HS-LS4-3), (HS-LS4-4)  •Adaptation also means that the distribution of traits in a population can change when conditions change. (HS-LS4-3)  •Changes in the physical environment, whether naturally occurring or human induced, have thus contributed to the expansion of some species, the emergence of new distinct species as populations diverge under different conditions, and the decline–and sometimes the extinction–of some species. (HS-LS4-5), (HS-LS4-6)  •Species become extinct because they can no longer survive and reproduce in their altered environment. If members cannot adjust to change that is too fast or drastic, the opportunity for the species’ evolution is lost. (HS-LS4-5)  LS4.D: Biodiversity and Humans  •Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. (HS-LS4-6)  ETS1.B: Developing Possible Solutions  •When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. (Secondary to HS-LS4-6)  •Both physical models and computers can be used in various ways to aid in the engineering design process. Computers are useful for a variety of purposes, such as running simulations to test different ways of solving a problem or to see which one is most efficient or economical; and in making a persuasive presentation to a client about how a given design will meet his or her needs. (Secondary to HS-LS4-6) | | |

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| **Stage 2 – Evidence** *How will you assess student learning?* | |
| **Evaluative Criteria** | **Assessment Evidence** |
|  | SUMMATIVE PERFORMANCE TASK(S)  Students can design a cell model/cell membrane or a product approved by myself. Students can explain the design work and discuss cell organelles and there functions. Students wo choose to create a model of the cell membrane can clearly show and discuss the role of the endomembrane system and different means of cellular transportation. Students must have used multiple resources for their design and outline of the procedure. This will allow me to check for understanding on why cell size matters.  Diffusion/Osmosis Lab. Egg Osmosis Lab. Write-up.  Unit Test/Quizzes/Foldables for vocabulary |
| <type here> | FORMATIVE ASSESSMENT  Venn-Diagram with Lecture. This is pre-assessment Prokaryote vs. Eukaryote  Structure labeling/function description. Group discussion on What do we know about these two types of cells and what are the similarities.  Case Studies. Tuberculosis bacteria. What do we know in order to solve or eliminate this disease?  Class discussions/Lectures/Promethean presentation  Cell film protein synthesis, cellular organelles etc.  Reading hand-outs  Bell ringers: To start the day’s lesson.  Practicing answering level II questions  Cell diffusion activity/ Lysol spray experiment  Food coloring lab Facilitated diffusion. |

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| **Stage 3 – Learning Plan** *What lessons will you teach, and what skills will students master, as a result of this unit?* | | | | |
| **Topical EU/EQ**  **For Lesson** | **CCSS Alignment with Stage 1** | **Formative Assessment of Lesson** | **Unit Modifications** | **Activities to Support the Lesson** |
| 1. Does the structure of cellular membranes effect the structure and function of the cell? How does this connect? 2. How might changes at the molecular and cellular stages affect the function of an organism and eventually an ecosystem? |  | Venn-Diagram with Lecture. This is pre-assessment Prokaryote vs. Eukaryote  Structure labeling/function description. Group discussion on What do we know about these two types of cells and what are the similarities.  Case Studies. Tuberculosis bacteria. What do we know in order to solve or eliminate this disease?  Class discussions/Lectures/Promethean presentation  Cell film protein synthesis, cellular organelles etc.  Reading hand-outs  Bell ringers: To start the day’s lesson.  Practicing answering level II questions  Cell diffusion activity/ Lysol spray experiment  Food coloring lab Facilitated diffusion. | Promethean, hands on activities. | Graphic organizers, put images in order from least complex to most complex.  Identify macromolecule based on characteristics  Macromolecule foldable/booklet  Informational/Text-Based Writing  Constructed response evaluate an enzyme graph and explain activation energy  Constructed Response- Identify the source, monomers, and functions of a macromolecule  Enzyme Lab with cow livers  Bursting Bhullar’s Biology Jeopardy game. |
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