Dixie State College of Utah

Secondary Education

CELLS UNIT PLAN

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| **Stage 1 – DESIRED RESULTS** | | |
| **Content Standards &**  **Goals**  Students will understand that all living things are made of cells that have structures and perform specific life functions.  Identify and use appropriate instrumentation to observe, describe, and compare various types of cells (e.g., onion, diatoms).  Observe and distinguish the cell wall, cell membrane, nucleus, chloroplast, and cytoplasm of cells.  Differentiate between plant and animal cells.  Model the cell processes of diffusion and osmosis.  Summarize the discoveries that led to the development of the cell theory.  **Content Standards &**  **Goals** | **Transfer** | |
| *Students will be able to independently use their learning to…*   * Distinguish between living and non-living things by determining whether they are cellular in nature. * Identify different types of cells and understand how their specific processes make life possible. * Formulate educated opinions regarding current bioethical issues and defend their positions using their scientific knowledge of cells. | |
| **Meaning** | |
| UNDERSTANDINGS  *Students will understand that…*   * All living things are made of cells. * The smallest unit that still retains the characteristics of life is the cell. * Each new cell arises from a pre-existing cell. * All living organisms are similar in that their cells contain similar structures and share similar cellular processes. * The invention of the microscope was necessary for the discovery of cells. | ESSENTIAL QUESTIONS  *Students will keep considering…*   * How can I apply what I know about life to controversial issues regarding the ‘definition of life’ such as, life-support and conception? * How might my understanding of cells be helpful in the study of health, illness, disease, and treatment? * How do we know what we know about cells? * How can today’s technology contribute to the increase of scientific knowledge? |
| **Acquisition** | |
| *Students will know…*   * How to determine whether an object is a living organism or not. * All living things are made up of cells. * Cellular structures, anatomy, and functions of cellular organelles (e.g., cell wall, cell membrane, nucleus, cytoplasm, mitochondria, chloroplasts, endoplasmic reticulum) * Cellular membrane processes such as diffusion and osmosis. * Cellular metabolic processes such as photosynthesis, and respiration. * The discoveries and contributions made by Hooke and others that led to the development of the cell theory. | *Students will be skilled at…*   * Observing and identifying various cells by using light microscopes. * Identifying and contrasting plant and animal cells by recognizing their differences (e.g., cell wall, membrane, chloroplasts). * Comparing and contrasting different prokaryotic and eukaryotic cells. * Modeling and explaining the cell processes of diffusion and osmosis. * Illustrating the codependent relationship between photosynthesis and respiration. |

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| **Stage 2 – EVIDENCE** | |
| PERFORMANCE TASK(S):  *Students will show that they really understand by evidence of…*   * Correctly identifying living vs non-living things by examining microscopic depictions of various objects. * Correctly identifying plant and animal cells and their respective cellular organelles. * Comparing and contrasting the anatomy of prokaryotic and eukaryotic cells using a Venn diagram. * Recognizing examples of diffusion and osmosis and know the difference between them. * Creating a concept map to illustrate the co-dependent nature photosynthesis and respiration. * Creating analogies between cellular organelles and their functions by comparing them to a factory. * Designing a 3D model of a plant or animal cell that includes accurate depictions/representations. * Collecting and interpreting data, making observations and sound inferences * Completing quizzes, bellwork, and other assessments with a competency of 70% or better.   PERFORMANCE TASK(S) CRITERIA:  *The performance task will be evaluated by…*   * Correctly identifying living vs non-living things as well as properly identifying plant and animal cells and their organelles will be assessed by how many correct answers recorded on a lab observation sheet. 70% correctly identified being proficient. * The Venn diagram of the prokaryotic and eukaryotic must be an accurate depiction of the traits they have in common vs those that differ. They must accurately identify at least two differences and two commonalities. * When shown a lab demonstration of diffusion or osmosis, students should be able to correctly answer relative questions with an accuracy of at least 70%. * The concept map relating photosynthesis to respiration will have to include at least five correct components and accurately depict the cyclic relationship. * Creating analogies between the components of a living cell and that of a working factory will need to include at least three appropriate analogies. * The 3D model must be 3D, must be include a cell membrane, a nucleus, cytoplasm, and mitochondria. If the model is for a plant cell, it must include a cell wall and chloroplast. The model must be appropriately labeled. The quality of the work and the accuracy of the information will also be assessed. * Lab notes of their data collection, sketches, observations, and inferences will be reviewed. Full credit will be given for work that is complete and where there is evidence that they had participated in the lab activity.   OTHER EVIDENCE:  *Students will show they have achieved Stage 1 goals by…*   * Answering thought provoking questions related to current issues regarding the definition of life or cellular research. Credit will be given to the extent that they are able to defend their position or viewpoint based on supportive biological knowledge that they acquired during the learning activities of the unit. * Creating a presentation of their choosing (music, poem, artwork, essay) that represents how the cell is the basic unit of life and includes how cellular processes are what sustain life. Credit will be given for the thoroughness of their work and how much of their new knowledge of the cell was applied to their project. | |
| **Stage 3 – LEARNING PLAN** | |
| PRE-ASSESSMENT:   * Benchmark tests given at the beginning of the unit will assess their prior knowledge. * True/False quizzes that include common misconceptions, given either as bellwork or at the beginning of a lesson. * A lab safety or proper microscope handling discussion prior to lab work can assess prior laboratory skills. | |
| MAJOR LEARNING EVENTS:   * Provide proper microscope use instruction and allow students to view various objects (prepared slides) under the microscope. Have them determine what they think is alive, sketch and write observations in lab book. * Why are plants green? Discuss and provide Powerpoint presentation about the differences between plant and animal cells and the role of photosynthesis and respiration. * Technological Integration: (http//learngenetics.utah.edu ) Provide interactive exploration of a 3D computer cell model and also the cell size and scale activity. * Provide lab opportunities for observing many different types of cells. Have students compare and contrast cellular structures and organelles using graphic organizers. * Demonstrate the concept of diffusion by spraying an air freshener in the corner of the room. Demonstrate the concept of osmosis and cell membrane function by using shelled raw eggs and immersing them in various liquids. Allow students to predict, observe, and collect data in their lab books. * Recreate the discovery of cells by Robert Hooke. View cork cells under a microscope. Make sketches, take notes, and ‘name’ your discovery. Write a letter to a friend informing them of your discovery and what significance it may have. * Use collaborative learning where groups can play matching games with cell organelles and their function or review key vocabulary terms. * Doctor for the day activity. Provide students with notecards of various unicellular organisms and have them determine what type of organism it is and how the patient should be treated based on what’s causing the infection/illness. * Relate social/political current events to scientific concepts learned in class. Allow students to make their inferences based on what they know or have learned. * ELL and IEP students can work in pairs to review vocabulary terms that prove to be challenging. Accomodations can be made for ELL or IEPs. For example, verbal answers could be given instead of paragraph/essay responses. | PROGRESS MONITORING:   * Class activities, group discussions, exit tickets, completion of class work will provide acquisition data. * Open ended, thought provoking questions given for bellwork will assess their meaning and transfer on a daily basis. * Assessments will be given regularly throughout the unit. At any time a student falls below the 70% proficiency mark they will be ‘stamped’ for Real Time intervention and feedback. |

Source: Wiggins, G, & McTighe, J. (2010). *The Understanding by Design Guide to High-Quality Units*. Alexandria, VA: ASCD.