



Republic of the Philippines

Department of Education

DepEd Complex, Meralco Avenue, Pasig City

STRENGTHENED SENIOR HIGH SCHOOL CURRICULUM

BIOLOGY 1

Grade 11

Course Description:

This course provides an introduction to the fundamental concepts of cell biology and metabolism, focusing on the structure, function, and importance of cells in living organisms. Learners investigate cell theory, cell types, the cell cycle, and how cells regulate the movement of substances to maintain homeostasis. The course also examines energy transformations in cells, covering photosynthesis and cellular respiration, with emphasis on key organelles such as chloroplasts and mitochondria. By the end of the course, learners understand how cells function, grow, reproduce, and generate energy to sustain life. They apply this knowledge to real-world topics, including human health, biotechnology, and environmental sustainability, developing analytical and problem-solving skills to examine biological processes and their relevance to everyday life.

Elective: Academic

Prerequisite: None

Time Allotment: 80 hours for one semester, 4 hours per week

Schedule: First Semester

Quarter 1: Cell Biology

Content	Content Standards <i>The learners learn that</i>	Learning Competencies <i>The learners</i>
1. The cell	<ol style="list-style-type: none">1. the cell theory is significant in explaining the structure and function of all living organisms;2. cells can be classified according to distinguishing structures and functions;	<ol style="list-style-type: none">1. use information from secondary sources to prepare a historical analysis to explain the significant contributions of scientists, including Robert Hooke, Antoine van Leeuwenhoek, Matthias Schleiden, and Rudolf Virchow, to the development of cell theory;2. use information from secondary sources to explain the differences and advantages between the light microscope and the electron microscopes in the study of cells;3. describe the four main parts of the modern cell theory;4. explain by drawing scaled diagrams the differences between prokaryotic and eukaryotic cells and their significance in the diversity and classification of life forms;

2. The cell cycle	3. the cell cycle consists of a series of phases, stages, and events; and	5. explain the phases of the cell cycle (interphase, M-phase, and cytokinesis) and their control points; 6. differentiate the stages and main features of cell division in prokaryotic and eukaryotic cells; 7. explain the processes of crossing over and recombination in meiosis that result in genetic variation among the meiotic offspring; 8. explain the significance of mitosis in growth, repair, regeneration of damaged cells, and meiosis for reproduction;
3. Transport mechanisms	4. cells have mechanisms that regulate the transport of substances in and out of the cell.	9. describe the transport mechanisms in cells, including passive transport (diffusion, osmosis, and facilitated diffusion) and active transport (pumps, endocytosis, and exocytosis); 10. explain the role of the cell membrane in maintaining cellular function and homeostasis; and 11. use information from secondary sources to explain how cellular abnormalities contribute to diseases, such as cancer, diabetes, and genetic disorders.
<p>Performance Standards <i>By the end of the quarter, learners discuss the scientific value of the interconnectedness of living organisms and their environment. They evaluate the significance of cell theory and its development in explaining the structure and function of living organisms. Learners classify cells based on their structures and functions, explain the stages and significance of the cell cycle, and describe the mechanisms of passive and active transport in maintaining homeostasis. They participate in practical activities and create presentations that showcase how these biological principles contribute to growth, repair, reproduction, and the diversity of life.</i></p>		
<p>Suggested Performance Task</p> <ul style="list-style-type: none"> Conduct a scientific investigation to model the process of diffusion by passive transport. Investigate the movement of molecules across a semipermeable membrane using water, iodine, and starch solution. 		

Quarter 2: Cell Metabolism

Content	Content Standards <i>The learners learn that</i>	Learning Competencies <i>The learners</i>
1. Cell requirements	1. all cells require energy, nutrients and removal of wastes;	1. identify that photosynthesis takes place within the cells of autotrophs with the aid of chloroplasts; 2. describe the role of chlorophyll and other pigments in capturing light energy in plants required for the photosynthesis reaction to take place;
2. Metabolism- photosynthesis	2. photosynthesis is the chemical reaction that transforms light energy into chemical energy; and	3. explain the balanced chemical equation for the process of photosynthesis and the synthesis of glucose (organic compound) from carbon dioxide, water, and light; 4. use a diagram to explain the key processes of photosynthesis, including the light-dependent reactions (ATP and NADPH generation) and the light-independent reactions (Calvin cycle and glucose synthesis); 5. use information from secondary sources to evaluate how photosynthesis can help reduce carbon dioxide levels in the environment;
6. Metabolism- respiration	3. cell respiration is the chemical reaction that converts chemical energy into usable forms of energy.	6. use a diagram to explain the steps in aerobic respiration, including glycolysis, acetyl coenzyme A, citric acid cycle, electron transport system, and chemiosmosis, including the importance of ATP as the energy carrier in cells and the role of enzymes; 7. describe how the structure of mitochondria relates to their function in cellular respiration; 8. differentiate between aerobic and anaerobic respiration, including their steps, ATP production, and byproducts; and 9. use information from secondary sources to explain how cellular respiration provides energy for everyday activities, such as running, thinking, and digesting food.
<p>Performance Standards <i>By the end of the Quarter, learners describe the processes of photosynthesis and cellular respiration and explain how these cellular mechanisms transform energy for life. They describe the role of cell structures in photosynthesis and differentiate the</i></p>		

light-dependent and light-independent reactions. Learners describe the stages of cellular respiration, including glycolysis, the citric acid cycle, and the Electron Transport Chain, and explain their role in ATP production for cellular activities. They also participate in experiments to create models and presentations that demonstrate how these processes sustain ecosystem stability and support life functions.

Suggested Performance Task

- Conduct a scientific investigation to observe the oxygen production of an aquatic plant (e.g., Hydrilla, Elodea, or Water Hyacinth) under different light conditions. Measure the rate of bubble formation using a beaker, water, and a light source to indicate photosynthesis activity. Write a report with a table of results, a graph, and an explanation of how light intensity affects the rate of photosynthesis.