

**K to 12 BASIC EDUCATION CURRICULUM  
SENIOR HIGH SCHOOL – SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS (STEM) SPECIALIZED SUBJECT**

**Grade:** Grade 11/12  
**Subject Title:** Biology 1\*

**Quarters:** 1st to 2nd Quarter  
**No. of Hours:** 40 hours/10 Weeks per Quarter

**Subject Description:** This subject is designed to enhance the understanding of the principles and concepts in the study of biology, particularly life processes at the cellular and molecular levels. It also covers the transformation of energy in organisms.

<b>CONTENT</b>	<b>CONTENT STANDARD</b>	<b>PERFORMANCE STANDARD</b>	<b>LEARNING COMPETENCIES</b>	<b>CODE</b>	<b>SCIENCE EQUIPMENT</b>
<b>Cell</b>	<i>The learners demonstrate an understanding of:</i> <ol style="list-style-type: none"> <li>Cell Theory</li> <li>Cell Structure and Functions</li> <li>Prokaryotic vs Eukaryotic Cells</li> <li>Cell Types</li> <li>Cell Modifications</li> </ol>	<i>The learners shall be able to:</i> <ol style="list-style-type: none"> <li>construct a 3D model of a plant/animal/bacterial cell using recyclable materials</li> <li>construct a cell membrane model from indigenous or recyclable materials</li> </ol>	<i>The learners...</i> <ol style="list-style-type: none"> <li>explain the postulates of the cell theory</li> </ol>	<b>STEM_BIO11/12-Ia-c-1</b>	
			<ol style="list-style-type: none"> <li>describe the structure and function of major and subcellular organelles</li> </ol>	<b>STEM_BIO11/12-Ia-c-2</b>	<ol style="list-style-type: none"> <li>Digital Microscope</li> <li>Gentian Violet, 100 ml / bottle</li> <li>Glass Cover Slips, 100's/box</li> <li>Glass Slides, 72's/box</li> <li>Iodine Solution, 100 ml / bottle</li> <li>Microscope, Compound</li> </ol>
			<ol style="list-style-type: none"> <li>distinguish prokaryotic and eukaryotic cells according to their distinguishing features</li> </ol>	<b>STEM_BIO11/12-Ia-c-3</b>	
			<ol style="list-style-type: none"> <li>classify different cell types (plant/animal tissues) and specify the function(s) of each</li> </ol>	<b>STEM_BIO11/12-Ia-c-4</b>	<ol style="list-style-type: none"> <li>Digital Microscope</li> <li>Evaporating Dish, 75 ml. capacity</li> <li>Microscope, Compound</li> </ol>
			<ol style="list-style-type: none"> <li>describe some cell modifications that lead to adaptation to carry out specialized functions</li> </ol>	<b>STEM_BIO11/12-Ia-c-5</b>	<ol style="list-style-type: none"> <li>Digital Microscope</li> </ol>

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			(e.g., microvilli, root hair)		2. Gentian Violet, 100 ml / bottle 3. Glass Cover Slips, 100's/box 4. Glass Slides, 72's/box 5. Iodine Solution, 100 ml / bottle 6. Microscope, Compound
	6. Cell Cycle a. Mitosis b. Meiosis		1. characterize the phases of the cell cycle and their control points	<b>STEM_BIO11/12-Id-f-6</b>	
			2. describe the stages of mitosis/meiosis given $2n=6$	<b>STEM_BIO11/12-Id-f-7</b>	1. Digital Microscope 2. Microscope, Compound 3. Model, Animal Meiosis 4. Model, Animal Mitosis
			3. discuss crossing over and recombination in meiosis	<b>STEM_BIO11/12-Id-f-8</b>	
			4. explain the significance or applications of mitosis/meiosis	<b>STEM_BIO11/12-Id-f-9</b>	
			5. identify disorders and diseases that result from the malfunction of the cell during the cell cycle	<b>STEM_BIO11/12-Id-f-10</b>	
	7. Transport Mechanisms a. Simple Diffusion b. Facilitated		1. describe the structural components of the cell membrane	<b>STEM_BIO11/12-Ig-h-11</b>	1. Digital Microscope 2. Microscope, Compound 3. Petri Dish

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	Transport		2. relate the structure and composition of the cell membrane to its function	<b>STEM_BIO11/12-Ig-h-12</b>	
	c. Active Transport		3. explain transport mechanisms in cells (diffusion osmosis, facilitated transport, active transport)	<b>STEM_BIO11/12-Ig-h-13</b>	Cork Borers, 4mm to 20mm OD, 12 borers/set
	d. Bulk/Vesicular Transport		4. differentiate exocytosis and endocytosis	<b>STEM_BIO11/12-Ig-h-14</b>	
<b>Biological Molecules</b>	Structures and Functions of Biological Molecules <ul style="list-style-type: none"> <li>- Carbohydrates</li> <li>- Lipids</li> <li>- Proteins</li> <li>- Enzymes</li> <li>- Nucleic Acids</li> </ul>		1. categorize the biological molecules(lipids, carbohydrates, proteins, and nucleic acids) according to their structure and function	<b>STEM_BIO11/12-Ii-j-15</b>	<ol style="list-style-type: none"> <li>1. Beaker, 250 ml., borosilicate</li> <li>2. Benedict's Solution, 100ml/bottle</li> <li>3. Beral Pipette Dropper, 1 ml. capacity</li> <li>4. Cork Stopper for Ø 16mm test tube</li> <li>5. Graduated Cylinder, 10 ml., soda lime</li> <li>6. Mortar and Pestle, 150 ml. capacity</li> <li>7. Rubber Stopper # 6 with 2 holes</li> <li>8. Rubber Stopper for Ø 16mm test tube</li> <li>9. Test Tube, Ø 16mm x 150mm long</li> <li>10. Tripod, Height: 6"</li> </ol>

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					11. Watch Glass, Ø 90mm
			2. explain the role of each biological molecule in specific metabolic processes	<b>STEM_BIO11/12-Ii-j-16</b>	
			3. describe the components of an enzyme	<b>STEM_BIO11/12-Ii-j-17</b>	
			4. explain oxidation/reduction reactions	<b>STEM_BIO11/12-Ii-j-18</b>	
			5. determine how factors such as pH, temperature, and substrate affect enzyme activity	<b>STEM_BIO11/12-Ii-j-19</b>	1. Alcohol Thermometer, -20°C to 110°C 2. Hand Gloves, acid/solvent-resistant, super nitrile 3. Litmus Paper Strips, blue, 100's/vial 4. Litmus Paper Strips, red, 100's/vial 5. Safety Goggles 6. Syringe, plastic, 30 ml. 7. Wash Bottle, plastic, 250 ml. 8. Watch Glass, Ø 90mm
<b>Energy Transformation</b>	1. ATP- ADP Cycle 2. Photosynthesis 3. Respiration	prepare simple fermentation setup using common fruits to produce wine or vinegar via microorganisms	1. explain coupled reaction processes and describe the role of ATP in energy coupling and transfer	<b>STEM_BIO11/12-IIa-j-1</b>	
			2. describe the major features and chemical events in photosynthesis and respiration	<b>STEM_BIO11/12-IIa-j-2</b>	1. Alcohol Thermometer, -20°C to 110°C 2. Bromthymol blue, 100 ml /

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					bottle 3. Filter Paper, ordinary, 24" x 24" sheet 4. Glass Funnel, Ø 50mm (Top Inside Diameter), 75mm long Stem 5. Graduated Cylinder, 10 ml., soda lime 6. Litmus Paper Strips, blue, 100's/vial 7. Litmus Paper Strips, red, 100's/vial 8. Tripod, Height: 6" 9. Yeast, granules, active dry yeast, 100 grams / bottle
			3. explain the importance of chlorophyll and other pigments	<b>STEM_BIO11/12-IIa-j-3</b>	
			4. describe the patterns of electron flow through light reaction events	<b>STEM_BIO11/12-IIa-j-4</b>	
			5. describe the significant events of the Calvin cycle	<b>STEM_BIO11/12-IIa-j-5</b>	
			6. differentiate aerobic from anaerobic respiration	<b>STEM_BIO11/12-IIa-j-6</b>	1. Wash Bottle, plastic, 250 ml. 2. Yeast, granules, active dry yeast, 100 grams / bottle

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			7. explain the major features and sequence the chemical events of cellular respiration	<b>STEM_BIO11/12-IIa-j-7</b>	3. Alcohol Thermometer, -20°C to 110°C 4. Bromthymol blue, 100 ml / bottle 5. Graduated Cylinder, 10 ml., soda lime 6. Litmus Paper Strips, blue, 100's/vial 7. Litmus Paper Strips, red, 100's/vial 8. Tripod, Height: 6" 9. Yeast, granules, active dry yeast, 100 grams / bottle
			8. distinguish major features of glycolysis, Krebs cycle, electron transport system, and chemiosmosis	<b>STEM_BIO11/12-IIa-j-8</b>	
			9. describe reactions that produce and consume ATP	<b>STEM_BIO11/12-IIa-j-9</b>	
			10. describe the role of oxygen in respiration and describe pathways of electron flow in the absence of oxygen	<b>STEM_BIO11/12-IIa-j-10</b>	
			11. compute the number of ATPs needed or gained in photosynthesis and respiration	<b>STEM_BIO11/12-IIa-j-11</b>	
			12. explain the advantages and disadvantages of fermentation and aerobic respiration	<b>STEM_BIO11/12-IIa-j-12</b>	

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**Code Book Legend**

**Sample: STEM\_BIO11/12-IIa-j-12**

LEGEND		SAMPLE	
<b>First Entry</b>	Learning Area and Strand/ Subject or Specialization	Science, Technology, Engineering and Mathematics	<b>STEM_BIO11/12</b>
	Grade Level	Grade 11 or 12	
<b>Uppercase Letter/s</b>	Domain/Content/ Component/ Topic	Biology	
			-
<b>Roman Numeral</b> <i>*Zero if no specific quarter</i>	Quarter	Second Quarter	<b>II</b>
<b>Lowercase Letter/s</b> <i>*Put a hyphen (-) in between letters to indicate more than a specific week</i>	Week	Weeks one to ten	<b>a-j</b>
			-
<b>Arabic Number</b>	Competency	explain the advantages and disadvantages of fermentation and aerobic respiration	<b>12</b>

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**References:**

Alberts, Bruce et. al. *Molecular biology of the cell. (5th ed.)*. New York: Garland Publishing, 2007.

Reece, Jane. B. et. al. *Campbell Biology (9th ed.)*. Boston: Pearson, 2011.