K to 12 BASIC EDUCATION CURRICULUM
SENIOR HIGH SCHOOL – CORE SUBJECT

Grade: 11/12
Core Subject Title: Earth and Life Science

Semester: 1
No. of Hours: 80 hours (20 Weeks)
Pre-requisite:

Core Subject Description: This learning area is designed to provide a general background for the understanding of Earth Science and Biology. It presents the history of the Earth through geologic time. It discusses the Earth's structure, composition, and processes. Issues, concerns, and problems pertaining to natural hazards are also included. It also deals with the basic principles and processes in the study of biology. It covers life processes and interactions at the cellular, organism, population, and ecosystem levels.

GRADE 11
FIRST QUARTER

CONTENT	CONTENT STANDARD	PERFORMANCE STANDARD	LEARNING COMPETENCIES	CODE	SCIENCE EQUIPMENT
I. ORIGIN AND STRUCTURE OF THE EARTH A. Universe and Solar System B. Earth and Earth Systems	*The learners demonstrate an understanding of:* 1. the formation of the universe and the solar system 2. the subsystems (geosphere, hydrosphere, atmosphere, and biosphere) that make up the Earth 3. the Earth's internal structure	*The learners shall be able to:* 1. Conduct a survey to assess the possible geologic hazards that your community may experience. *(Note: Select this performance standard if your school is in an area near faultlines, volcanoes, and steep slopes.)* 2. Conduct a survey or design a study to assess the possible hydrometeorological hazards that your community may experience. (*Note: Select this performance standard if your school is in an area that is frequently hit by tropical cyclones and is usually flooded.*)	*The learners:* 1. State the different hypotheses explaining the origin of the universe.	**S11/12ES -Ia-e-1**	
			2. Describe the different hypotheses explaining the origin of the solar system.	**S11/12ES -Ia-e-2**	
			3. Recognize the uniqueness of Earth, being the only planet in the solar system with properties necessary to support life.	**S11/12ES -Ia-e-3**	
			4. Explain that the Earth consists of four subsystems, across whose boundaries matter and energy flow.	**S11/12ES -Ia-e-4**	
			5. Explain the current advancements/information on the solar system	**S11/12ES -Ia-e-5**	
			6. Show the contributions of personalities/people on the understanding of the earth systems	**S11/12ES -Ia-e-6**	
			7. Identify the layers of the Earth (crust, mantle, core).	**S11/12ES -Ia-e-7**	

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			8. Differentiate the layers of the Earth.	**S11/12ES -Ia-e-8**	
II. EARTH MATERIALS AND PROCESSES A. Minerals and Rocks	*The learners demonstrate an understanding of:* 1. the three main categories of rocks		*The learners:* 1. identify common rock-forming minerals using their physical and chemical properties 2. classify rocks into igneous, sedimentary, and metamorphic	**S11/12ES -Ia-9**	1. Hand Lens, at least 10x magnification 2. Rock Samples Box, 24 compartments
	2. the origin and environment of formation of common minerals and rocks			**S11/12ES -Ib-10**	1. Hand Lens, at least 10x magnification 2. Rock Samples Box, 24 compartments
B. Exogenic Processes	3. geologic processes that occur on the surface of the Earth such as weathering, erosion, mass wasting, and sedimentation (include the role of ocean basins in the formation of sedimentary rocks)		3. describe how rocks undergo weathering	**S11/12ES -Ib-11**	
			4. explain how the products of weathering are carried away by erosion and deposited elsewhere	**S11/12ES -Ib-12**	
			5. make a report on how rocks and soil move downslope due to the direct action of gravity	**S11/12ES -Ib-13**	
C. Endogenic Processes	4. geologic processes that occur within the Earth		6. describe where the Earth's internal heat comes from.	**S11/12ES -Ib-14**	
			7. describe how magma is formed (magmatism)	**S11/12ES -Ic-15**	
	5. the folding and faulting of rocks		8. describe what happens after the magma is formed (plutonism and volcanism)	**S11/12ES -Ic-16**	
			9. describe the changes in mineral components and texture of rocks due to changes in pressure and temperature (metamorphism)	**S11/12ES -Ic-17**	

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			10. compare and contrast the formation of the different types of igneous rocks	**S11/12ES -Ic-18**	
			11. describe how rocks behave under different types of stress such as compression, pulling apart, and shearing	**S11/12ES -Ic-19**	
D. Deformation of the Crust	6. plate tectonics		12. explain how the continents drift	**S11/12ES -Id-20**	
			13. cite evidence that support continental drift	**S11/12ES -Id-21**	
			14. explain how the movement of plates leads to the formation of folds and faults	**S11/12ES -Id-22**	
			15. explain how the seafloor spreads	**S11/12ES -Id-23**	
			16. describe the structure and evolution of ocean basins	**S11/12ES -Id-24**	
E. History of the Earth	7. how the planet Earth evolved in the last 4.6 billion years (including the age of the Earth, major geologic time subdivisions, and marker fossils).		17. describe how layers of rocks (stratified rocks) are formed	**S11/12ES -Ie-25**	
			18. describe the different methods (relative and absolute dating) to determine the age of stratified rocks	**S11/12ES -Ie-26**	
			19. explain how relative and absolute dating were used to determine the subdivisions of geologic time	**S11/12ES -Ie-27**	
			20. describe how marker fossils (also known as guide fossils) are used to define and identify subdivisions of the geologic time scale	**S11/12ES -Ie-28**	
			21. describe how the Earth's history can be interpreted from the geologic time scale	**S11/12ES -Ie-29**	
III. NATURAL HAZARDS, MITIGATION, AND ADAPTATION A. Geologic Processes and Hazards	*The learners demonstrate an understanding of:* 1. the different hazards caused by geological processes (earthquakes,		*The learners:* 1. describe the various hazards that may happen in the event of earthquakes, volcanic eruptions, and landslides	**S11/12ES -If-30**	

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	volcanic eruptions, and landslides)				
B. Hydrometeorological Phenomena and Hazards	2. the different hazards caused by hydrometeorological phenomena (tropical cyclones, monsoons, floods, and tornadoes or *ipo-ipo*)		2. using hazard maps, identify areas prone to hazards brought about by earthquakes, volcanic eruptions, and landslides	**S11/12ES -If-31**	
			3. give practical ways of coping with geological hazards caused by earthquakes, volcanic eruptions, and landslides	**S11/12ES -If-32**	
			4. identify human activities that speed up or trigger landslides	**S11/12ES -If-33**	
			5. suggest ways to help lessen the occurrence of landslides in your community	**S11/12ES -Ig-34**	
C. Marine and Coastal Processes and their Effects	3. the different hazards caused by coastal processes (waves, tides, sea-level changes, crustal movement, and storm surges)		6. describe the various hazards that may happen in the wake of tropical cyclones, monsoons, floods, or ipo-ipo	**S11/12ES -Ig-35**	
			7. using hazard maps, identify areas prone to hazards brought about by tropical cyclones, monsoons, floods, or ipo-ipo	**S11/12ES -Ig-36**	
			8. give practical ways of coping with hydrometeorological hazards caused by tropical cyclones, monsoons, floods, or ipo-ipo	**S11/12ES -Ih-37**	
			9. describe how coastal processes result in coastal erosion, submersion, and saltwater intrusion	**S11/12ES -Ih-38**	
			10. identify areas in your community prone to coastal erosion, submersion, and saltwater intrusion	**S11/12ES -Ii-39**	
			11. give practical ways of coping with coastal erosion, submersion, and saltwater intrusion	**S11/12ES -Ii-40**	
			12. cite ways to prevent or mitigate the impact of land development, waste disposal, and construction of structures on control coastal processes	**S11/12ES -Ii-41**	

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I. INTRODUCTION TO LIFE SCIENCE	*The learners demonstrate an understanding of:* 1. the historical development of the concept of life 2. the origin of the first life forms 3. unifying themes in the study of life	*The learners shall be able to:* value life by taking good care of all beings, humans, plants, and animals	*The learners:* 1. explain the evolving concept of life based on emerging pieces of evidence	**S11/12LT -IIa-1**	
			2. describe classic experiments that model conditions which may have enabled the first forms to evolve	**S11/12LT -IIa-2**	
			3. describe how unifying themes (e.g., structure and function, evolution, and ecosystems) in the study of life show the connections among living things and how they interact with each other and with their environment	**S11/12LT -IIa-3**	
II. BIOENERGETICS	*The learners demonstrate an understanding of:* 1. the cell as the basic unit of life 2. how photosynthetic organisms capture light energy to form sugar molecules 3. how organisms obtain and utilize energy	*The learners shall be able to:* make a poster that shows the complementary relationship of photosynthesis and cellular respiration	*The learners:* 1. explain how cells carry out functions required for life	**S11/12LT -IIbd-4**	
			2. explain how photosynthetic organisms use light energy to combine carbon dioxide and water to form energy-rich compounds	**S11/12LT -IIbd-5**	1. Beral Pipette Dropper, 1 ml. capacity 2. Bromthymol blue, 100 ml / bottle 3. Filter Paper, ordinary, 24" x 24" sheet 4. Glass Funnel, Ø 50mm (Top Inside Diameter), 75mm long Stem 5. Test Tube, Ø 16mm x 150mm long 6. Wash Bottle, plastic, 250 ml.
			3. trace the energy flow from the environment to the cells.	**S11/12LT -IIbd-6**	

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			4. describe how organisms obtain and utilize energy	**S11/12LT -IIbd-7**	1. Alcohol Thermometer, -20ºC to 110ºC 2. Beaker, 250 ml., borosilicate 3. Bromthymol blue, 100 ml / bottle 4. Graduated Cylinder, 10 ml., soda lime 5. Tripod, Height: 6" 6. Litmus Paper Strips, blue, 100's/vial 7. Litmus Paper Strips, red, 100's/vial 8. Yeast, granules, active dry yeast, 100 grams / bottle
			5. recognize that organisms require energy to carry out functions required for life	**S11/12LT -IIbd-8**	
III. PERPETUATION OF LIFE	*The learners demonstrate an understanding of:* 1. plant and animal reproduction	*The learners shall be able to:* conduct a survey of products containing substances that can trigger genetic disorders such as phenylketonuria	*The learners:* 1. describe the different ways of how plants reproduce	**S11/12LT -IIej-13**	
			2. illustrate the relationships among structures of flowers, fruits, and seeds	**S11/12LT -IIej-14**	
			3. describe the different ways of how representative animals reproduce	**S11/12LT -IIej-15**	
	2. how genes work		4. explain how the information in the DNA allows the transfer of genetic information and synthesis of proteins	**S11/12LT -IIej-16**	

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	3. how genetic engineering is used to produce novel products		5. describe the process of genetic engineering	**S11/12LT -IIej-17**	
			6. conduct a survey of the current uses of genetically modified organisms	**S11/12LT -IIej-18**	
			7. evaluate the benefits and risks of using GMOs	**S11/12LT -IIej-19**	
IV. HOW ANIMALS SURVIVE	*The learners demonstrate an understanding of:* 1. nutrition: getting food to cells 2. gas exchange with the environment 3. circulation: the internal transport system 4. the need for homeostasis 5. salt and water balance and waste removal 6. the immune system: defense from disease 7. how hormones govern body activities 8. the nervous system 9. the body in motion	*The learners shall be able to:* make a presentation of some diseases that are associated with the various organ systems	*The learners:* 8. explain the different metabolic processes involved in the various organ systems	**S11/12LT -IIIaj-20**	1. Alcohol Thermometer, -20ºC to 110ºC 2. Beaker, 250 ml., borosilicate 3. Beral Pipette Dropper, 1 ml. capacity 4. Graduated Cylinder, 10 ml., soda lime 5. Test Tube, Ø 16mm x 150mm long 6. Wash Bottle, plastic, 250 ml.
			9. describe the general and unique characteristics of the different organ systems in representative animals	**S11/12LT -IIIaj-21**	Dissecting Set
			10. analyze and appreciate the functional relationships of the different organ systems in ensuring animal survival	**S11/12LT -IIIaj-22**	Model, Human Torso
V. HOW PLANTS SURVIVE	*The learners demonstrate an understanding of:* 1. plant form and function *2.* plant growth	*The learners shall be able to:* design a setup on propagating plants using other methods such as hydroponics and aeroponics	*The learners:* 11. describe the structure and function of the different plant organs	**S11/12LT -IVae-23**	1. Digital Microscope 2. Hand Lens, at least 5x magnification 3. Microscope, Compound

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	and development				4. Petri Dish
			12. explain the different metabolic processes involved in the plant organ systems	**S11/12LT -IVae-24**	
VI. THE PROCESS OF EVOLUTION	*The learners demonstrate an understanding of:* 1. the evidence for evolution 2. the origin and extinction of species	*The learners shall be able to:* Design a poster tracing the evolutionary changes in a crop plant (e.g., rice or corn) that occurred through domestication	*The learners:* 13. describe evidence of evolution such as homology, DNA/protein sequences, plate tectonics, fossil record, embryology, and artificial selection/agriculture	**S11/12LT -IVfg-25**	
			13. explain how populations of organisms have changed and continue to change over time showing patterns of descent with modification from common ancestors to produce the organismal diversity observed today	**S11/12LT -IVfg-26**	
			14. describe how the present system of classification of organisms is based on evolutionary relationships	**S11/12LT -IVfg-27**	
VII. INTERACTION AND INTERDEPENDENCE	*The learners demonstrate an understanding of:* 1. the principles of the ecosystem 2. biotic potential and environmental resistance 3. terrestrial and aquatic ecosystems 4. how human activities affect the natural ecosystem	*The learners shall be able to:* prepare an action plan containing mitigation measures to address current environmental concerns and challenges in the community	*The learners:* 15. describe the principles of the ecosystem	**S11/12LT -IVhj-28**	
			16. categorize the different biotic potential and environmental resistance (e.g., diseases, availability of food, and predators) that affect population explosion	**S11/12LT -IVhj-29**	
			17. describe how the different terrestrial and aquatic ecosystems are interlinked with one another	**S11/12LT -IVhj-30**	

GLOSSARY

Absolute Dating	The process of determining an approximate computed age in archaeology and geology
Artificial Selection	The process in the breeding of animals and in the cultivation of plants by which the breeder chooses to perpetuate only those forms having certain desirable traits or characteristics
Bioenergetics	Energy transformations and energy exchanges within and between living things and their environments
Calvin Cycle	The term for the cycle of dark reactions in photosynthesis
Embryology	The study of organisms at their early stages of development
Endogenic	Refers to internal processes and phenomena that occur beneath the Earth's surface, or any other celestial body's
Genetic Engineering	The deliberate and controlled manipulation of genes in an organism, with the intent of making that organism better in some way
Genetically Modified Organism	An organism whose genetic material has been altered using genetic engineering techniques. Organisms that have been genetically modified include micro-organisms such as bacteria and yeast, insects, plants, fish, and mammals
Geologic Process	A natural process whereby geological features are modified
Homology	The study of likeness in structure between parts of different organisms (e.g., the wing of a bat and the human arm) due to evolutionary differentiation from a corresponding part in a common ancestor
Hydrometeorological Hazards	The process or phenomenon of atmospheric, hydrological, or oceanographic nature that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage
Metamorphism	The process of dramatic changes in body form in the life cycle of some animals
Physiology	The study of the functions of living things and their parts
Plate Tectonics	The branch of geology that studies the folding and faulting of the Earth's crust
Plutonism	The formation of intrusive igneous rocks by solidification of magma beneath the earth's surface
Relative Dating	A technique used to determine the age of fossils by comparing them with other fossils in different layers of rock

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SENIOR HIGH SCHOOL – CORE SUBJECT

Code Book Legend

Sample: S11/12ES-Ia-e-1

LEGEND		SAMPLE	
First Entry	Learning Area and Strand/ Subject or Specialization	Science	**S11/12**
	Grade Level	Grade 11/12	
Uppercase Letter/s	Domain/Content/ Component/ Topic	Earth Science	**ES**
			-
Roman Numeral **Zero if no specific quarter*	Quarter	First Quarter	**I**
Lowercase Letter/s **Put a hyphen (-) in between letters to indicate more than a specific week*	Week	Weeks one to five	**a-e**
			-
Arabic Number	Competency	State the different hypotheses explaining the origin of the universe	**1**

DOMAIN/ COMPONENT	CODE
Earth Science	ES
Life Science	LT

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.