

Dubai International School-Al Quoz
Science Department (Grades 9-12)
Curriculum Annual Plan
Grade: 11 Subject: Honors Biology 2024-2025

TERM-I

EMSAT Requirement	NGSS PE Code	DCIs	Unit /Topic	Learning Objectives	Week No. & Date	No. of Lessons
Section -2 This section includes inheritance of traits and heredity and genetic technology. Inheritance of traits focuses on cell growth and division emphasizing on the behavior of chromosomes during different phases and consequences of specific errors during these phases. It also encompasses gene	HS-LS1-1.	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)	Unit -6 Human Genetics – Chapter 22 22.1 : DNA and RNA structure and function. Chapter : 22.2	<ul style="list-style-type: none"> Explain how models of DNA changed over time as new scientific evidence emerged, resulting in the final consensus model. Explain how the structure of DNA & determines the structure of proteins which carry out the essential functions of life through systems of specialized cells. Elucidate transcription, post-transcriptional modifications and translation and relate these processes to gene expression in prokaryotes & Eukaryotes. 	W1: 26/08/2024/ 30/08/2024	4

<p>expression and regulation in eukaryotes and prokaryotes, genetic variations and modes of inheritance including</p>		<p>(HS -LS 3-1)</p>		<ul style="list-style-type: none"> Apply genetic code rules to read the DNA sequence and to identify the amino acids in the polypeptide chain & describe genetic variation and population diversity. 		
<p>Section -2 This section includes inheritance of traits and heredity and genetic technology. Inheritance of traits focuses on cell growth and division emphasizing on the behavior of chromosomes during different phases and consequences of specific errors during these phases. It also encompasses gene expression and regulation in eukaryotes and</p>	<p>HS-LS1-1 HS -LS 3-1</p>	<p>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)</p> <p>(HS -LS 3-1)</p>	<p>Unit -6 Human Genetics – Chapter -21 : Genetic inheritance. Chapter 22.2</p>	<ul style="list-style-type: none"> Relate the role of DNA and chromosome in coding instructions. Describe genetic variation and population diversity with respect to DNA. Explain how the structure of DNA relates to an organism’s phenotype and genotype. 	<p>W2: 2/9 / 2024- 6/9 / 2024</p>	<p>4</p>

<p>prokaryotes, genetic variations and modes of inheritance including</p>						
<p>Section -2 This section includes inheritance of traits and heredity and genetic technology. Inheritance of traits focuses on cell growth and division emphasizing on the behavior of chromosomes during different phases and consequences of specific errors during these phases. It also encompasses gene expression and regulation in eukaryotes and prokaryotes, genetic variations</p>	<p>HS-LS3-2</p>	<p>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)</p>	<p>Unit -6 Human Genetics Chapter 22: 22.1: Gene Expression Chapter 20: 20.1: cancer results from gene mutation</p>	<p>Collect evidence to support the idea of genetic variation Infer that the gene regulation can take place at various steps of gene expression emphasizing Lac operon concept.</p> <ul style="list-style-type: none"> •Analyse the cause and effect of mutation. •Explain the different environmental factors affecting mutation. •Analyse data to make predictions about how changes in DNA affect an organism’s phenotype. 	<p>W3: 09/9/2024- 13/9/2024</p>	<p>4</p>

and modes of inheritance including						
Section -2 Mendelian and non-Mendelian genetics. Heredity and genetic technology focus on the importance of genetic engineering in medicine, industry and agriculture with the emphasis on their impact on human's life.	HS-LS1-1	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	Chapter 19: Patterns of chromosome inheritance 19.2: Cell cycle 19.3: Mitosis 19.4: Meiosis	<ul style="list-style-type: none"> • Explain the different stages of cell division mitosis & meiosis. • Explain the importance of cell growth and cell division and describe the possible errors occur during cell cycle. • Explain why asexual reproductive strategies do not lead to genetic diversity. • Explain the advantage(s) of asexual reproduction strategies for organisms. • Explain how meiotic cellular division followed by fertilization leads to genetic diversity within a population. 	W4: 16/9/2024- 21/9/2024	4
Section -2 This section includes inheritance of traits and heredity and genetic technology. Inheritance of traits focuses on cell growth and division emphasizing on the	HS-LS1-4	Growth and Development of Organisms ♣ In multicellular organism's 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	Chapter 21: 21.3: Inheritance and genetic disorder 21.4: Beyond simple inheritance pattern 21.2 : one and two trait inheritance	<p>Evaluate the significance of mendelian genetics to determine the phenotype and genotype and predict the probable outcome of offspring.</p> <p>Apply Punnett square to determine the genotypic and phenotypic ration in first and second generation.</p> <p>Explain the various modes of inheritance including co-dominance,</p>	W5: 23/9/2024- 27/9/2024 29/9/2023 Prophet's Birthday)	4

<p>behavior of chromosomes during different phases and consequences of specific errors during these phases. It also encompasses gene expression and regulation in eukaryotes and prokaryotes, genetic variations and modes of inheritance including</p>		<p>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.</p>	<p>21.5 : Sex linked inheritance</p>	<p>sex linked polygenetic trait and multiple alleles. (Non-Mendelian Inheritance)</p> <p>Apply pedigree to predict the inheritance of a trait within a family.</p>		
<p>Section -2 This section includes inheritance of traits and heredity and genetic technology. Inheritance of traits focuses on cell growth and division emphasizing on the behavior of chromosomes during different phases and consequences of</p>	<p>HS-LS1-4</p>	<p>Growth and Development of Organisms ♣ In multicellular organism's 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</p>	<p>Chapter 22.3 : DNA Technology</p>	<p>Evaluate the importance of genetic engineering in medicine & agriculture, citing its positive and negative effects in different fields.</p> <p>Describe different techniques (PCR, gel electrophoresis & DNA Profiling)used to manipulate DNA</p> <p>Explain how gene therapy is used to treat genetic disorders.</p>	<p>W6: 30/9/2024 04/09/2024</p>	<p>4</p>

specific errors during these phases. It also encompasses gene expression and regulation in eukaryotes and prokaryotes, genetic variations and modes of inheritance including		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.		Discuss genomics including how genomics might lead to better treatment for illness.		
				PROJECT WEEK	W7: 07/9/2024 11/09/2024	
Section 1 Section 1: From molecules to living organisms: Structure and function. The chemistry of life focuses on the importance of biological macromolecules in the body and the properties of water that allow life to exist on earth, as	HS-LS2-3 HS-LS1-5 HS-LS1-6	Photosynthesis and cellular respiration (including anaerobic processes) provide most of the energy for life processes 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,	Unit 1 : Human Organization Chapter2 : Chemistry of life 2.2 : Water and life 2.3 : Molecules of life 2.7 : ATP , An energy carrier	Distinguish between the four major categories of carbon compounds in terms of composition, energy values, and primary functions in the body. Explain the importance of ATP in the body. Relate the properties of water to its roles in living organisms. •	W8 14/09/204 18/09/2024	8

<p>well as the role of enzymes in chemical reactions carried out in living organisms. It also focuses on the major cellular processes of breaking energy (photosynthesis and cellular respiration) and energy transformation.</p>		<p>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 product</p>	<p>3.6 : Metabolism and energy reaction</p>	<p>Explain the role and effect of enzymes and other factors, such as pH and temperature, in the chemical reactions carried out in living organisms.</p>		
<p>Section 1 Living organisms' organization and development focuses of the role of the cell in different living organisms emphasizing on cellular structures and their functions, as well as the use of microscopes in cellular studies. In addition, this part</p>	<p>HS-LS2-3 HS-LS1-5 HS-LS1-6</p>	<p>Photosynthesis and cellular respiration (including anaerobic processes) provide most of the energy for life processes 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)</p>	<p>3.6 : Metabolic pathways</p> <p>Unit 1</p> <p>Chapter 3: 3.1 : Microscopy</p>	<p>Illustrate using models how light energy is transformed to chemical energy.</p> <p>Identify and summarize the major cellular processes of breaking energy-rich molecules to obtain energy.</p> <p>transfer in cell occurs under anaerobic condition (fermentation)</p>	<p>W9 17/10/2022 21/10/2022</p>	

<p>focuses on major body systems and processes in living organisms. It emphasizes the role of body systems in different living organisms with relation to the importance of the interaction between the body systems in maintaining the internal body environment.</p>		<p>☒ 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)</p> <p>☒ As matter and energy flow through different Organizational levels of living systems, chemical elements are recombined in different ways to form different product</p>		<p>Explain the three steps of cellular respiration -Glycolysis, Krebs cycle and Electron transport chain.</p> <p>Differentiate between aerobic and anerobic respiration and how energy</p> <p>Demonstrate a good understanding of handling and using the light microscope for examination purposes, and compare with electron microscope in terms of resolution, magnification and use</p>		
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EMSAT Requirement	NGSS PE Code	DCIs	Unit /Topic	Learning Objectives	Week No. & Date	No. of Lessons
QUARTER- II						
<p>Section 1 Living organisms' organization and development focuses of the role of the cell in different living organisms emphasizing on cellular structures and their functions, as well as the use of microscopes in cellular studies. In addition, this part focuses on major body systems and processes in living organisms. It emphasizes the role of body systems in different living organisms with relation to the importance of the interaction between the body systems in maintaining the internal body environment.</p> <p>Section 3:</p>	<p>HS-LS1-2 HS-LS1-3</p>	<p>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</p>	<p>UNIT 7 : Human evolution and Ecology.</p> <p>Chapter 23.2: Biological evolution.</p>	<p>Discuss the early developed concepts of evolution by Lamarck.</p> <p>Describe the scientific discoveries that informed the theory of natural selection.</p> <p>Analyze the relationship between fossilized organisms and living organisms.</p> <p>Explore how genetic variation of trait in population increases individuals' probability of survival.</p>	<p>W10: 28/10 /2024 1/11 /2024</p>	<p>4</p>

<p>Evolution and Diversity of Life This section includes evolution and diversity of life. Evolution focuses on theory and evidence of evolution to determine the evolutionary relationships among different species, as well as evolutionary processes such as natural selection and genetic drift and their consequences on the populations' stability.</p>	<p>HS-LS4-1</p>				<p>W11: 5/11 2024 8/11/2024</p>	<p>4</p>
<p>Section 3: Evolution and Diversity of Life This section includes evolution and diversity of life. Evolution focuses on theory and evidence of evolution to determine the evolutionary relationships among different species, as well as evolutionary processes such as natural selection and</p>	<p>HS-LS4-2</p>	<p>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.</p>	<p>Evolution & Natural selection External Resources</p>	<p>Explore Charles Darwin's theory of evolution and the evidence that lead to the discovery.</p> <p>Analyze theory of evidence to support the modern theory of evolution.</p> <p>Describe how selective pressures in the</p>	<p>W12 11/11/2024 15/12/2024</p>	<p>4</p>

genetic drift and their consequences on the populations' stability.				environment can affect an organism's fitness. Explain how selective pressures in the environment could cause shift in phenotypic and /or allelic frequency.		
Section 3: Evolution and Diversity of Life This section includes evolution and diversity of life. Evolution focuses on theory and evidence of evolution to determine the evolutionary relationships among different species, as well as evolutionary processes such as natural selection and genetic drift and their consequences on the populations' stability.	HS-LS-4-2	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.	Chapter 23.3: Classification of human Chapter 23.5: Evolution of human.	Analyze the relationship between homologous structures in different animals to infer evolutionary relationship. Describe how living organisms are classified and categorize them according to specific structural and functional characteristics. Create and explain a simple cladogram to explain the evolutionary relationship. Analyze the three types of homologies to provide evidence to support common ancestors	W13: 18/11/ 2024 22/11/2024	4

<p>Section 3: Evolution and Diversity of Life This section includes evolution and diversity of life. Evolution focuses on theory and evidence of evolution to determine the evolutionary relationships among different species, as well as evolutionary processes such as natural selection and genetic drift and their consequences on the populations' stability.</p>	<p>HS-LS4-3</p>	<p>variation in the expression of that genetic information — that is, trait variation — that leads to differences in performance among individuals.</p>	<p>Variation & Genetic Drift</p>	<p>Distinguish between microevolution & macroevolution</p> <p>Explore the mechanism of evolution leading to variation.</p> <p>Compare and contrast bottleneck effect and founder effect during genetic drift.</p> <p>Predict how allelic frequency in a population shift in response to genetic drift .</p>	<p>W14: 25/11-2024 29/11/2024</p>	<p>2</p>
<p>Section 3: Evolution and Diversity of Life This section includes evolution and diversity of life. Evolution focuses on theory and evidence of evolution to determine the evolutionary relationships among different species, as well as evolutionary processes such as</p>	<p>HS-LS4-3</p>	<p>Speciation occurs when populations of the same species are separated, resulting in reduced gene flow, which over time allows populations to become genetically distinct from one another.</p> <p>a. Geographic separation: a physical barrier (e.g., rivers changing course, glacial movement, continental drift).</p> <p>b. Habitat specialization: niche differentiation from others in the population.</p>	<p>Speciation</p>	<p>. Explain how geographic separation events can lead to the formation of new species.(Galapagos island)</p> <p>Describe mechanisms that contribute to reproductive separation that could lead to speciation.</p> <p>Explore Wegener's idea of drifting continents and describe</p>	<p>W15: 4/12/2024 6/12/2024</p>	<p>4</p>

natural selection and genetic drift and their consequences on the populations' stability.		<p>c. Behavioral separation: different mating habits, times, or locations from others in the population.</p> <p>d. Mechanical separation: structural differences in sex organs that make individuals within a population unable to reproduce with one another</p>		<p>the evidence he cited to support his hypothesis.</p> <p>Apply, evidence to support the claim that rates of speciation have varied throughout Earth's history.</p>		
		Project WEEK			W16: 09/12/ 2024 13/12/2024	4
		Winter Break			DEC 16 th JAN 5 th 2025	
		FINALIZING LESSONS AND REVISION WEEK.			W17	
		WEEK 18 and 19 : SEMESTER ONE FINAL/MAKEUP/BR EAK BETWEEN SEMESTER				