

Dubai International Private School DIPS, in partnership with parents and community, strives to prepare every Student to be digitally literate, a lifelong learner, and a productive citizen



CollegeBoard AP

Dubai International School-Al Quoz Science Department (Grades 4-12) Curriculum Annual Plan Grade: 12 -Subject: AP Biology -2024-2025

TERM-I

Big Idea	Enduring Understanding (EU)	Unit	Topics	Learning Objectives	Week No. & Date	No. of Lessons					
	QUARTER- I										
			 Introduction to AP Science Skill Diagnostic Test 	AP Biology Framework ls overview	W1: 26/08/2024- 30/08/2024	4					
Unit 1 Big Ideas: 2&4	SYI-1 Living systems are organized in a hierarchy of structural levels that interact. ENE-1 The highly complex organization of living systems requires constant input of energy and the exchange of macromolecules	Unit 1	 1.1 Structure of Water and Hydrogen Bonding 1.2 Elements of Life 1.4 Properties of Biological Macromolecu les. 	 SYI-1.A: Explain how the properties of water that result from its polarity and hydrogen bonding affect its biological function. ENE-1.A: Describe the composition of macromolecules required by living organisms. SYI-1.B Describe the properties of the monomers and the type of bonds that connect the monomers in biological macromolecules. 	W2: 02/09/2024- 06/09/2024	5					
Unit 1 Big Ideas: 2&4 Unit 2: Big Ideas 1,2&4	SYI-1 Living systems are organized in a hierarchy of structural levels that interact. IST-1 Heritable information provides for continuity of life. SYI-1 Living systems are organized in a hierarchy of structural levels that interact.	2	 1.4 Structure and Function of Biological Macromolecules 1.5 Nucleic Acids 2.1 Cell Structure: Subcellular Components. 2.2 Cell Structure and Function 	SYI-1.C: Explain how a change in the subunits of a polymer may lead to changes in structure or function of the macromolecule.IST 1.A Describe the structural similarities and differences between DNA and RNA.SYI-1.D: Describe the structure and/or function of subcellular components and organelles.SYI-1.E: Explain how subcellular components and organelles contribute to the function of the cell.	W3: 09/9 – 13/9	5					
	ENE-2 Cells have membranes that allow them to		2.3: Cell Size	Explain the effect of surface area-to-volume ratios on the exchange of materials between cells or organisms	W4: 16/9 – 20/09	5					

	establish and maintain internal environments that are different from their external environments		 2.4: Plasma Membranes 2.5: Membrane Permeability 2.6 Membrane Transport 	and the environment. ENE-2.A: Describe the roles of each of the components of the cell membrane in maintaining the internal environment of the cell. ENE-2.C: Explain how the structure of biological membranes influences selective permeability. ENE-2.E: Describe the mechanisms that organisms use to maintain solute and water balance.		
			 2.7: Facilitated Diffusion. 2.8: Tonicity and Osmoregulation 2.9: Mechanisms of Transport. 2.10: Compartmentaliza tion 	ENE-2.G :Explain how the structure of a molecule affects its ability to pass through the plasma membrane. ENE-2.H: Explain how concentration gradients affect the movement of molecules across membranes. ENE-2.J: Describe the processes that allow ions and other molecules to move across membranes. ENE-2.K: Describe the membrane bound structures of the eukaryotic cell. ENE-2.L: Explain how internal membranes and membrane bound organelles contribute to compartmentalization of eukaryotic cell functions.	W5: 23/09 – 27/09	5
Big Ideas 2&4	EVO-1 Evolution is characterized by a change in the genetic makeup of a population over time and is supported by multiple lines of evidence ENE-1 The highly complex organization of living systems requires constant input of energy and the exchange of macromolecules.	Unit 2 Unit 3	2.11: Origins of Cell Compartmentaliza tion 3.1 Enzyme Structure. 3.2 Enzyme Catalysis 3.3 Environmental Impacts on Enzyme Function	 EVO-1.A: Describe similarities and/or differences in compartmentalization between prokaryotic & Eukaryotic cells. EVO-1.B: Describe the relationship between the functions of endosymbiotic organelles and their free-living. ENE-1.D: Describe the properties of enzymes. ENE-1.E: Explain how enzymes affect the rate of biological reactions. ENE-1.F: Explain how changes to the structure of an enzyme mayaffect its function ENE-1.G: Explain how the cellular environment affects enzyme activity. 	W6: 30/09 - 04/10	5

			3.4: Cellular	ENE-1.H: Describe the role of energy	W7:07/10 - 11/10	5
			Energy	in living organisms.		
			3.5 Photosynthesis	ENE-1.I Describe the photosynthetic processes that allow organisms to capture and store		
				energy. ENE-1.J: Explain how cells capture energy from light and transfer it to biological molecules for storage and		
	SVI-3		3.6 Cellular Respiration	ENE-1.K: Describe the processes that allow organisms to use energy stored in biological macromolecules.		
	Naturally occurring diversity among and between components within biological systems affects interactions with the environment		3.7 Fitness	SYI-3.A: Explain the connection between variation in the number and types of molecules within cells to the ability of the organism to survive and/or reproduce in different environments.		
Dia		Unit 4	4.1. Call	ICT 2 A. Deserites the mars that	W0.14/10 10/10	
Ideas	Cells communicate by generating,	Unit 4	Communication	cells can communicate with one another	W8: 14/10 - 18/10	5
	transmitting, receiving, and			IST-3.B: Explain how cells communicate with one		
	responding to			another over short and		
	chemical signais.		4.2	IST-3.C: Describe the components		
			Signal	pathway.		
			Transduction	IST-3.D: Describe the role of		
				components of a signal transduction pathway		
				in producing a cellular		
				IST-3.E Describe the role of the		
				cellular response.		
			4.3 Signal	IST-3.F: Describe the different types of cellular responses elicited		
			Transduction	by a signal transduction		
			4.4	IST-3.G Explain how a change in the	W9: 21/10 - 25/10	5
			Transduction Pathways	structure of any signaling molecule affects the activity of the signaling pathway.		
			4.5	ENE-3A: Describe positive and/		
			Feedback	or negative feedback mechanisms.		
				ENE-3.B: Explain how negative feedback helps to maintain homeostasis.		
				ENE-3.C: Explain how positive feedback affects homeostasis.		
			4.6: Cell Cvcle	IST-1.B:Describe the events that occur in the cell cycle.		
	IST-1 Heritable			IST-1.C: Explain how mitosis results		
	information provides			chromosomes from one		
	for continuity of life.			generation to the next.		

4.7: Regulation Cell Cycle	on of IST-1.D: Describe the role of checkpoints in regulating the cell cycle. IST-1.E: Describe the effects of disruptions to the cell cycle				
	on the cell or organism				
END OF QUARTER-I					

Big Enduring Unit Topic **Learning Objectives** Week Date No. of Understanding Ideas Lessons (EU) **QUARTER-II** IST-1.F: Explain how meiosis results W10: 28/10 - 01/11 Big IST-1: Heritable 5 5.1 5 Ideas information provides for in the transmission of Meiosis 1,3&4 continuity of life. chromosomes from one generation to the next. IST-1.G: Describe similarities and/ or differences between the phases and outcomes of mitosis and meiosis. EVO-2: Organisms are 5.2 IST-1.H: Explain how the process of linked by lines of descent Meiosis and meiosis generates genetic from common ancestry. Genetic diversity. Diversity EVO-2.A: Explain how shared, 5.3 conserved, fundamental Mendelian processes and features Genetics support the concept of common ancestry for all organisms. IST-1: Heritable IST-1.I: Explain the inheritance of information provides for genes and traits as described continuity of life. by Mendel's laws. IST-1.J: Explain deviations from W11:04/11-8/11 5 5.4: Non-5 Mendelian Mendel's model of the Genetics. inheritance of traits. 5.5: SYI-3.B: Explain how the same SYI-3: Naturally occurring Environmental genotype can result in diversity among and multiple phenotypes under Effects between components different environmental on Phenotype Big within biological conditions. Idea 3 systems affects 5.6: interactions with the Chromosomal SYI-3.C: Explain how chromosomal inheritance generates environment Inheritance genetic variation in sexual 6.1 reproduction. IST-1: Heritable Unit 6 DNA and IST-1.K: Describe the structures information provides for **RNA** Structure involved in passing hereditary continuity of life. information from one generation to the next. IST-1.L: Describe the characteristics of DNA that allow it to be used as the hereditary material.

	IST-2: Differences in the expression of genes account for some of the phenotypic differences between organisms.	6	 6.2 Replication 6.3 Transcription and RNA Processing 6.4: Translation 6.5 Regulation of Gene Expression. 	IST-1.M: Describe the mechanisms by which genetic information is copied for transmission between generations. IST-1.N: Describe the mechanisms by which genetic information flows from DNA to RNA to protein. IST-1.O: Explain how the phenotype of an organism is determined by its genotype. IST-2.A: Describe the types of interactions that regulate gene expression. IST-2.B: Explain how the location of regulatory sequences relates to their function.	W12: 11/11 – 15/11	5
Big ideas 1&4	IST-4: The processing of genetic information is imperfect and is a source of genetic variation. IST-1: Heritable information provides for continuity of life. EVO-1: Evolution is characterized by a change in the genetic makeup of a population over time and is supported by multiple lines of evidence.	Unit 7	6.6: Gene Expression and Cell Specialization 6.7 Mutations	IST-2.C: Explain how the binding of transcription factors to promoter regions affects gene expression and/or the phenotype of the organism. IST-2.D: Explain the connection between the regulation of gene expression and phenotypic differences in cells and organisms IST-2.E: Describe the various types of mutation. IST-4.A: Explain how changes in genotype may result in changes in phenotype. IST-4.B: Explain how alterations in DNA sequences contribute to variation that can be subject to natural selection.	W13: 18/11 - 22/11	5
Big ideas 1&4	EVO-1: Evolution is characterized by a change in the genetic makeup of a population over time and is supported by multiple lines of evidence	7	 6.8 Biotechnology 7.1 Introduction to Natural Selection 7.2 Natural Selection 7.3 Artificial Selection 	IST-1.P: Explain the use of genetic engineering techniques in analyzing or manipulating DNA. EVO-1.C: Describe the causes of natural selection EVO-1.D: Explain how natural selection affects populations. EVO-1.E: Describe the importance of phenotypic variation in a population. EVO-1.F: Explain how humans can affect diversity within a population. EVO-1.G: Explain the relationship between changes in the environment and evolutionary changes in the population	W14: 25/11 - 29/11	5

EVO-1: Evolution is characterized by a change in the genetic makeup of a population over time and is supported by multiple lines of evidence	7	7.4 Population Genetics 7.5 Hardy- Weinberg Equilibrium	EVO-1.H: Explain how random occurrences affect the genetic makeup of a population. EVO-1.I: Describe the role of random processes in the evolution of specific populations. EVO-1.J: Describe the change in the genetic makeup of a population over time. EVO-1.K: Describe the conditions under which allele and genotype frequencies will change in populations. EVO-1.L: Explain the impacts on the population if any of the conditions of Hardy- Weinberg are not met.	W15: 02/12 - 06/12	5
EVO-1: Evolution is characterized by a change in the genetic makeup of a population over time and is supported by multiple lines of evidence EVO-2: Organisms are linked by lines of descent from common ancestry.	7	7.6 Evidence of Evolution 7.7 Common Ancestry	EVO-1.M: Describe the types of data that provide evidence for evolution. EVO-1.N: Explain how morphological, biochemical, and geological data provide evidence that organisms have changed over time EVO-2.B: Describe the fundamental molecular and cellular features shared across all domains of life, which provide evidence of common ancestry. EVO-2.C: Describe structural and functional evidence on cellular and molecular levels that provides evidence for the common ancestry of all eukaryotes	W16: 09/12- 13/12	5

EVO-3	7.8	EVO-3.A: Explain how evolution is	W17:06/1-10/1	5			
Life continues to evolve	Continuing	an ongoing process in all					
onvironment	7.9	EVO-3 B: Describe the types of					
chivit onnicht.	Phylogeny	evidence that can be used to infer an					
	rinyiogeny	evolutionary					
		relationship.					
		EVO-3.C: Explain how a phylogenetic					
		tree and/or cladogram can be used to					
		infer evolutionary					
		relatedness.					
	7.10 Secondarian	EVO-3.D: Describe the conditions					
	Speciation	$EVO_2 = CONTRACT From the species may arise.$					
		evolution and speciation under					
		different ecological conditions.					
		EVO-3.F: Explain the processes and					
		mechanisms that drive speciation					
EVO-3: Life continues to evolve within a changing	7.11 Extinction	EVO-3.G: Describe factors that lead to the extinction of a population.	W18: 13/1 - 25/1	5			
environment.		EVO-3.H: Explain how the risk of					
		extinction is affected by					
		changes in the environment.					
		an ecosystem as a function					
		of speciation and extinction					
		rates.					
		EVO-3.J: Explain how extinction can					
		make new environments					
		available for adaptive					
END OF QUARTER-II							