



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



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 |
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| QUARTER- I | | | | | | |
| | | | <ul style="list-style-type: none"> - Introduction to AP Biology Framework - AP Science Skills overview - Diagnostic Test | | 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 Macromolecules. | 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 | SYI-1 Living systems are organized in a hierarchy of structural levels that interact. | 1 | 1.4 Structure and Function of Biological Macromolecules | SYI-1.C: Explain how a change in the subunits of a polymer may lead to changes in structure or function of the macromolecule. | W3: 09/9 – 13/9 | 5 |
| Unit 2: Big Ideas 1,2&4 | IST-1 Heritable information provides for continuity of life. SYI-1 Living systems are organized in a hierarchy of structural levels that interact. | 2 | 1.5 Nucleic Acids 2.1 Cell Structure: Subcellular Components. 2.2 Cell Structure and Function | 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. | | |
| | 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 |

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| | SYI-3 Naturally occurring diversity among and between components within biological systems affects interactions with the environment | | 3.4: Cellular Energy 3.5 Photosynthesis 3.6 Cellular Respiration 3.7 Fitness | ENE-1.H: Describe the role of energy in living organisms. 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 use. ENE-1.K: Describe the processes that allow organisms to use energy stored in biological macromolecules. 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. | W7:07/10 – 11/10 | 5 |
| Big Ideas 2&3 | IST-3 Cells communicate by generating, transmitting, receiving, and responding to chemical signals. | Unit 4 | 4.1: Cell Communication 4.2 Introduction to Signal Transduction 4.3 Signal Transduction | IST-3.A: Describe the ways that cells can communicate with one another IST-3.B: Explain how cells communicate with one another over short and long distances. IST-3.C: Describe the components of a signal transduction pathway. IST-3.D: Describe the role of components of a signal transduction pathway in producing a cellular response. IST-3.E Describe the role of the environment in eliciting a cellular response. IST-3.F: Describe the different types of cellular responses elicited by a signal transduction pathway. | W8: 14/10 – 18/10 | 5 |
| | IST-1 Heritable information provides for continuity of life. | | 4.4 Changes in Signal Transduction Pathways 4.5 Feedback 4.6: Cell Cycle | IST-3.G Explain how a change in the structure of any signaling molecule affects the activity of the signaling pathway. ENE-3A: Describe positive and/or negative feedback mechanisms. ENE-3.B: Explain how negative feedback helps to maintain homeostasis. ENE-3.C: Explain how positive feedback affects homeostasis. IST-1.B: Describe the events that occur in the cell cycle. IST-1.C: Explain how mitosis results in the transmission of chromosomes from one generation to the next. | W9: 21/10 – 25/10 | 5 |

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| | 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 |

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| | <p>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</p> | 7 | <p>7.4 Population Genetics</p> <p>7.5 Hardy-Weinberg Equilibrium</p> | <p>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.</p> | W15: 02/12 – 06/12 | 5 |
| | <p>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</p> <p>EVO-2: Organisms are linked by lines of descent from common ancestry.</p> | 7 | <p>7.6 Evidence of Evolution</p> <p>7.7 Common Ancestry</p> | <p>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</p> | W16: 09/12– 13/12 | 5 |

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