MCS IB Biology Year 1 Subject Group Overview – New Syllabus 24-25 HL

Themes: A = Unity & Diversity, B = Form & Function, C = Interaction & Interdependence, D = Continuity & Change
Level of Organization: 1 = Molecules, 2 = Cells, 3 = Organisms, 4 = Ecosystems

Time	S1-9 weeks	S1-9 weeks	S2-8 weeks	S2-7 weeks	S2-3 weeks
Unit Name	**Cells**	**Molecules**	**Metabolism**	**Genetics**	**Internal Assessments (IAs)**
IB Topics Theme = Letter Level of Organization = #	**HL A2.2**.1-2.2.11, **B2.2**.1-2.2.3, **B2.3**.1-2.3.6 **B2.1**.1-2.1.10, **D2.3**.1-2.3.7 **HL A2.2**.12-A2.1.14, **A2.3**, **B2.2**.4-2.2.9, **B2.3**.7-2.3.10, **B2.1**.11-2.1.17, **D2.3**.8-2.3.11	**HL A1.1**.1-1.1.6, **A1.2**.1-1.2.10, **B1.1**, **B1.2.1-1.2.5** **HL A1.1**.7-1.1.8, **A1.2**.11-1.2.15, **B1.2.6-1.2.12**	**HL C1.1**.1-1.1.10, **C1.2**.1-1.2.6, **C1.3**.1-1.3.8, **D1.1**.1-1.1.5, **D1.2**.1-1.1.11 **HL C1.1**.11-1.1.17, **C1.2**.7-1.2.17, **C1.3**.9-1.3.19, **D1.1**.6-1.1.9, **D1.2**.12-1.1.19	**HL D1.3**.1-1.3.7, **D2.1**.1-2.1.11, **D3.2**.1-3.2.15 **HL D1.3**.8-1.3.10, **D2.1**.12-D2.1.17, D2.2, **D3.2**.16-3.2.21	Internal assessments (IAs)
Content Specific Information (texts, documents, methods)	**Statement of Inquiry:** All living things are composed of cells with similar structures and life cycles. **Phenomenon:** With sickle cell disease, an inherited group of disorders, red blood cells contort into a sickle shape. The cells die early, leaving a shortage of healthy red blood cells (sickle cell anemia), and can block blood flow causing pain (sickle cell crisis). **Crosscutting Concepts** ● Structure and Function ● Interactions ● Stability and Change ● Patterns	**Statement of Inquiry:** Various Functions of a cell can be predicted through the complex structures of their molecules. **Phenomenon:** Sickle cell disease is caused by mutations in the beta-globin (HBB) gene that lead to the production of an abnormal version of a subunit of hemoglobin — the protein responsible for carrying oxygen in red blood cells **Crosscutting Concepts** ● Structure and Function ● Interactions ● Stability and Change ● Patterns **CORE IDEAS** ● Properties of Water ● Organic Compounds ● Chemistry Basics ● Macromolecules: Nucleic Acids,	**Statement of Inquiry:** Research is continuously being conducted to find novel applications for enzymes that will promote human health and wellness. **Phenomenon:** The beta globin protein is one of the subunits of hemoglobin, a protein necessary for the oxygen-carrying function of red blood cells. People with the sickle cell mutation in both copies of the HBB gene produce proteins that clump together and lead to changes in the shape and behavior of red blood cells. **Crosscutting Concepts** ● Stability and Change ● Systems & System Models ● Cause and Effect ● Patterns	**Statement of Inquiry:** Advancements in biotechnology supports complex research into the inheritance patterns and genetics of all living things. **Phenomenon:** The causes and effects of sickle cell anemia – A base substitution mutation drives significant phenotypic change in humans. **Crosscutting Concepts** ● Structure and Function ● Systems and System models ● Patterns **CORE IDEAS** ● Genes: Mutations/Variation ● Cell Division: Mitosis/Meiosis/ Cytokinesis ● Down Syndrome/Nondisjunction	Assessments in IB Biology – Year 1 – Internal Assessment Student Investigation Proposal Practice IB style Exams over Year 1 Topics – simulating Paper 1 and Paper 2 Note: The exams will be practiced throughout the year. **Crosscutting Concepts:** ALL **CORE IDEAS:** What is the IA? Academic Integrity Policy Rubrics Developing a research question Variable

Published: 8,2024 Resources, materials, assessments not linked to SGO or unit planner will be reviewed at the local school level.

MCS IB Biology Year 1 Subject Group Overview – New Syllabus 24-25 HL

	CORE IDEAS ● Cellular Structure: Prokaryotic / Eukaryotic Cells/Animal/Plant Cells - Functions of Life ● Membrane and Membrane Transport ● Organelles and Compartmentalization ● Cell Specialization ● Water Potential ● Origins of cells (HL Only) ● Viruses (HL Only)	Carbohydrates, Lipids, & Proteins	**CORE IDEAS** ● Enzymes ● Cellular Energy: Respiration/Fermentation/Photosynthesis ● DNA Replication ● Protein Synthesis	● Inheritance: Patterns ● Haploid/Diploid ● Phenotype/Genotype ● Phenylketonuria (PKU) ● Single Nucleotide Polymorphisms (SNPs) ● ABO Blood Groups ● Incomplete ● Codominance ● Sex determination ● Sex Linked Traits ● Continuous inheritance due to Polygenic inheritance or environmental factors ● Gene expression (HL Only)	Identification Methodology for individual or collaborative work Research design Data Analysis Statistics Conclusion Evaluation *Will go over all parts of the IA and assign the design proposal only in Y1.
	SEP ● Asking Questions and Defining Problems ● Developing & Using Models ● Constructing Explanations ● Carrying Out Investigations	**SEP** ● Carrying out investigations ● Asking Questions and Defining Problems ● Developing & Using Models ● Engage in Argument from Evidence	**SEP** ● Carrying out Investigations ● Developing & Using Models ● Constructing Explanations ● Engage in Argument from Evidence	**SEP** ● Asking Questions and Defining Problems ● Carry out Investigations. ● Engage in Argument from Evidence	**SEP** ● Asking Questions ● Defining Problems ● Develop & Use Models ● Engage in Argument from Evidence
Assessments / Major Projects	Unit Formative and Summative assessment(s) **Applications of Skills:** Microscopy Skills (A2.2): ▪ Slide preparation ▪ Staining ▪ Measuring sizes using an eyepiece graticule	● Unit Formative and Summative assessment(s) ● Properties of Water Lab (A1.1) ● Protein Project (Database) (B1.2) **Applications of Skills:** Visualization software of Nucleosome structure (HL Only)	● Unit Formative and Summative assessment(s) *Will test on separate processes not on one Unit Assessment **Applications of Skills:** ● Practicum: Investigation of a factor affecting enzyme activity – interpret graphs (C1.1) ● Determine reaction rates through experimentation and secondary data for enzyme catalyzed reactions. (C1.1)	● Unit Formative and Summative assessment(s) ● Data analysis: Human Genome project: base sequencing analysis **Applications of Skills:** ● Identify phases of mitosis and meiosis using diagrams, viewed with a microscope, and/or micrograph (D2.1) ● Distinction between continuous variables such as skin color and discrete	IA proposal ● Research Question ● Variables ● Research ● Materials ● Methods ● Safety Practice IB Exam questions: Papers 1 and 2

MCS IB Biology Year 1 Subject Group Overview – New Syllabus 24-25 HL

	▪ Focusing using fine and coarse adjustments ▪ Calculating actual size and magnification ▪ Producing a scale bar and taking photographs ▪ Identify cell types and structures in light and electron micrographs (A2.2) ▪ Draw and annotate (functions) diagrams of organelles and cellular structures based on electron micrographs (A2.2) ▪ Cell Membrane Modeling and Transport Lab (B2.1) ▪ Surface Area to Volume Ratios/Cell Size Modeling (B2.3) ▪ Water Potential Lab – Plants –Measure changes in tissue length and mass and analyze data to deduce isotonic solute concentrations (standard deviation and standard error/error bars) (D2.3)		● Interpret graphs showing the energy required to make and break bonds with substrates (C1.1) ● Measure the rate of cellular respiration – what affects cellular respiration rate? (C1.2) ● Thin layer or paper Chromatography- pigmentation of spinach leaves – calculate Rf values – identify pigments by color and value (C1.3) ● Determine the rate of photosynthesis from data for oxygen production and carbon dioxide consumption for varying wavelengths – plot data to make an action spectrum (C1.3) ● Rates of Photosynthesis Lab – limiting factors (C1.3)	variables such as ABO blood groups – apply measures of central tendency – mean, median, and mode (D3.2) ● Use Box and Whisker plots to display six aspects of data: outliers, minimum, , first quartile, median, third quartile, and maximum ● Observe populations of cells to determine mitotic index (Cancerous vs. Non-Cancerous Cells) D2.1.17 (HL Only) ● Explore genes and polypeptide products in databases (HL Only) ○ Pairs of genes with loci on different chromosomes (HL Only) ○ Pairs of genes in close proximity on same chromosome (HL Only)	
Level Specific Differentiation	Marietta City Schools teachers provide specific differentiation of learning experiences for all students. Details for differentiation for learning experiences are included on the district unit planners.				

MCS IB Biology Year 1 Subject Group Overview – New Syllabus 24-25 HL

Resources	• Textbook Pearson Biology for the IB Diploma Standard and Higher Level • IB Biology Guide First Assessment 2025 • Van de Lagemaat, R. www.inthinking.net: Andorra la Vella, Andorra, 2019. • IB Biology Schoology Course • Discovery Education Biology and Chemistry Resources