

# IB Biology Y2 - MHS Subject Group Overview

**Themes:** A = Unity & Diversity, B = Form & Function, C = Interaction & Interdependence, D = Continuity & Change

**Level of Organization:** 1 = Molecules, 2 = Cells, 3 = Organism, 4 = Ecosystems

Unit Name	Internal Assessments (IA) (Ongoing through March)	Unit 1 Responding to the Environment: Body Systems	Unit 2 Responding to the Environment: Plant Systems	Unit 3 Biodiversity & Environment	Unit 4 Ecosystems: Interactions & Interdependence	Unit 5 Ecosystems: Human Impacts	Exams/ Review
<b>Time</b>	Ongoing August Through March 2025	S1: 9 weeks	S1: 6 weeks	S1: 5 weeks	S2: 6 weeks	S2: 4 weeks	6 Weeks May 2025 Exam
<b>Topics</b> Theme = Letter Level of Organization = #	All Topics Student Choice	<b>B3.1.1-3.1.6,</b> <b>B3.2.1-3.2.6,</b> <b>C2.2.1-2.2.7,</b> <b>C3.1.1-3.1.16,</b> <b>C3.2.1-3.2.18,</b> <b>D3.1.1-3.1.7,</b> <b>D3.3.1-3.3.6</b>  Review C1.1 & C1.2	B3.1.7-3.1.10, B3.2.7-B3.2.10, D2.3.1-2.3.6, D3.1.8-3.1.12  Review C1.2 & C1.3	A4.1.1 - 4.1.7, D4.1.1-4.1.8, A3.1.1-3.1.11, A4.2.1-A4.2.8  Review D1.1, D1.2, D1.3, D2.2	<b>B4.1.1-4.1.8,</b> <b>B4.2.1-4.2.13,</b> <b>C4.1.1-4.1.18,</b> <b>C4.2.1-4.2.22</b>	<b>D4.2.1-4.2.11,</b> <b>D4.3.1-4.3.8</b>	All Topics
<b>Content-Specific</b>	<b>Scientific investigation</b> 20% of the final IB score in the class. 10 hours minimum Required Student work is internally assessed by the teacher and externally moderated by the IB.  <b>Internal Assessment Components</b> Research Design 6 Marks Data Analysis *Statistics 6 Marks	<b>Statement of Inquiry:</b> The physiology of the Immune, endocrine, and nervous systems allow humans to maintain homeostasis in a changing environment. *Sickle Cell Theme  <b>Phenomenon:</b> The correction of anemia in Sickle Cell Disease requires careful balancing of the	<b>Statement of Inquiry:</b> The structure of plant systems allows plants to respond to their environment in order to maintain homeostasis in a changing environment.  <b>Phenomenon:</b> The therapeutic potential of extracts from the leaves and seeds of <i>Cajanus cajan</i> (pigeon pea), leaves of <i>Zanthoxylum zanthoxyloides</i>	<b>Statement of Inquiry:</b> Changing environments cause selective pressures on organisms resulting in the diversity of life on earth.  <b>Phenomenon:</b> In some parts of the world, the infectious parasitic disease malaria and the genetic disease sickle cell anemia are intimately connected.	<b>Statement of Inquiry:</b> In recent years, the underlying biochemical unity of all plants, animals and microbes has become increasingly apparent.  <b>Phenomenon:</b> Plasmodium falciparum is a protozoan parasite that has adapted to live and reproduce in mosquitoes and humans.	<b>Statement of Inquiry:</b> Humans modify the environment which can cause benefits to some populations while harming others.  <b>Phenomenon:</b> Humans spray insecticides and modify the environment to decrease the population of mosquitoes carrying malaria.	Review all Topics.

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	<p>Conclusion 6 Marks Evaluation 6 Marks</p>	<p>detrimental effects of anemia with the potential risks associated with increased blood viscosity.</p> <p><b>Crosscutting Concepts:</b> Structure &amp; Function Systems &amp; System models Cause and Effect Stability and Change Patterns</p>	<p>(artar root) and leaves of <i>Carica papaya</i> (papaya) by extracting molecules in the structures and applying them to blood samples from Sickle Cell Disease patients is under investigation.</p> <p><b>Crosscutting Concepts:</b> Structure &amp; Function Systems &amp; System models Cause and Effect Interactions &amp; Equilibrium Stability &amp; Change</p>	<p><b>Crosscutting Concepts:</b> Systems &amp; System models Patterns Cause and Effect</p>	<p><b>Crosscutting Concepts:</b> Energy and Matter: Flows, Cycles, and Conservation Stability and Change of Systems Patterns Scale, Proportion, and Quantity</p>	<p><b>Crosscutting Concepts:</b> Stability and Change of Systems Cause and Effect Patterns</p> <p><b>Core Ideas:</b> Stability of Ecosystems Deforestation Keystone Species Human Impact: Pollution and Climate Change Sustainability of Resource Harvesting Eutrophication Biomagnification Succession (HL Only)</p>	
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	<p><b>Crosscutting Concepts:</b> ALL</p> <p><b>SEP:</b> ALL</p> <p><b>Core Ideas:</b> Can come from any topic in the course that interests the students, and a scientific investigation can be conducted</p>	<p><b>Core Ideas:</b> Integration of Body Systems Levels of organization Responding to the Environment Hormones Feedback mechanisms Homeostasis Thermoregulation</p> <p><b>SEP</b></p> <ul style="list-style-type: none"> <li>Asking Questions and Defining Problems</li> <li>Constructing Explanations</li> <li>Analyze &amp; Interpret Data</li> </ul>	<p><b>Core Ideas:</b> Gas Exchange Transport Neural Signaling Defense against Disease Reproduction/Germination Homeostasis</p> <p><b>SEP:</b></p> <ul style="list-style-type: none"> <li>Analyze &amp; Interpret Data</li> <li>Developing and Using Models</li> <li>Planning and Carrying out Investigations</li> <li>Use Mathematics and Computational Thinking</li> </ul>	<p><b>Core Ideas:</b> Evolution and Speciation Natural Selection Diversity of Organisms Conservation of Biodiversity Extinction</p> <p><b>SEP:</b></p> <ul style="list-style-type: none"> <li>Developing and Using Models</li> <li>Obtaining, Evaluating, and Communicating information</li> <li>Analyzing and Interpreting Data</li> </ul>	<p><b>Core Ideas:</b> Adaptation to the Environment Ecological Niches Populations and Communities Transfers of Energy and Matter</p> <p><b>SEP:</b></p> <ul style="list-style-type: none"> <li>Developing and Using Models</li> <li>Obtaining, Evaluating, and Communicating information</li> <li>Analyzing and Interpreting Data</li> <li>Planning and Carrying out Investigations</li> </ul>	<p><b>SEP:</b></p> <ul style="list-style-type: none"> <li>Use Mathematics and Computational Thinking</li> <li>Obtaining, Evaluating, and Communicating information</li> <li>Analyzing and Interpreting Data</li> </ul>	
<p><b>Assessments/ Major Projects</b></p> <p>Unit Formative and Summative assessment(s)</p>		<p>Research Paper - How does sickle cell affect homeostasis?</p> <p>Homeostasis: Negative Feedback Pathways in the Human Body Activity</p> <p><b>Applications of Skills:</b> <b>B3.1.6</b> Measurement of lung volumes <b>B3.2.2</b> Distinguish arteries and veins in micrographs</p>	<p><b>Applications of Skills:</b> <b>B3.1.10</b> Use micrographs or perform leaf casts to determine stomatal density. <b>B3.2.9</b> Distribution of tissues in a transverse section of the stem of a dicotyledonous plant from micrographs <b>B3.2.10</b> Distribution of tissues in a transverse section of the root of a dicotyledonous plant from micrographs</p>	<p><b>Applications of Skills:</b> <b>D4.1.8</b> Modelling of sexual and natural selection based on experimental control of selection pressures -Interpret data from John Endler's experiments with guppies. <b>A3.1.7</b> Karyotyping and karyograms -classify chromosomes by banding patterns, length and centromere position-</p>	<p><b>Applications of Skills:</b> <b>B4.1.4</b> Use transect data to correlate the distribution of plant or animal species with an abiotic variable from a natural or semi-natural habitat. <b>B4.2.8</b> Students should examine models or digital collections of skulls to infer diet from the anatomical features. Examples may include <i>Homo sapiens</i> (humans), <i>Homo</i></p>	<p><b>Applications of Skills:</b> <b>D4.2.3</b> Deforestation of Amazon rainforest as an example of a possible tipping point in ecosystem stability - Calculate % change from original area of the forest</p>	<p>IB Biology Exam in May</p> <p>Final Internal Assessment complete</p>

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		<p><b>B3.2.4</b> Measurement of pulse rate - carotid or radial - by hand and digital</p> <p><b>B3.2.6</b> Evaluate epidemiological data relating to the incidence of coronary heart disease.</p> <p><b>C2.2.4</b> Variation in the speed of nerve impulses - +/- correlations and apply correlation coefficients and the coefficient of determination</p> <p><b>C3.2.18</b> Evaluation of data related to the COVID-19 pandemic - calculate both percentage difference and percentage change</p>	<p><b>D2.3.4</b> Measure changes in tissue length and mass, and analyze data to deduce isotonic solute concentration -use standard deviation and standard error to help in the analysis of data.</p> <p>Review Measure the rate of cellular respiration – what affects cellular respiration rate? (C1.2)</p> <p>Thin layer or paper Chromatography- pigmentation of spinach leaves – calculate Rf values – identify pigments by color and value (C1.3)</p> <p>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)</p> <p>Rates of Photosynthesis Lab – limiting factors (C1.3)</p>	<p>evaluate the evidence for the hypothesis that chromosome 2 in humans arose from the fusion of chromosomes 12 and 13 with a shared primate ancestor</p> <p><b>A3.1.10</b> Extract information about genome size for different taxonomic groups from a database to compare genome size to organism complexity</p>	<p><i>floresiensis</i> and <i>Paranthropus robustus</i></p> <p><b>C4.1.3</b> Random quadrat sampling to estimate population size for sessile organisms (plants and animals) - number counts suitable - standard deviation of the mean</p> <p><b>C4.1.4</b> Capture–mark–release –recapture and the Lincoln index to estimate population size for motile organisms</p> <p><b>C4.1.7</b> Population Growth Curves - test the growth of a population against the model of exponential growth using a graph with a logarithmic scale for size of population on the vertical axis and a non-logarithmic scale for time on the horizontal axis</p> <p><b>C4.1.8</b> Modelling of the sigmoid population growth curve-collect data regarding population growth. Yeast and duckweed are recommended but other organisms that proliferate under experimental conditions could be used</p>		
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<b>Level Specific Differentiation ALL UNITS</b>	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.
<b>Resources</b>	<a href="#">MCS Science Resources</a> <ul style="list-style-type: none"><li>● Textbook Pearson Biology for the IB Diploma Standard and Higher Level</li><li>● <a href="#">IB Biology Guide First Assessment 2025</a></li><li>● Van de Lagemaat, R. <a href="http://www.inthinking.net">www.inthinking.net</a>: Andorra la Vella, Andorra, 2019.</li><li>● IB Biology Schoology Course</li><li>● Discovery Education Biology and Chemistry Resources</li></ul>