**IB Subject Group: Sciences** **Course: Biology** **Year: 4**

| Unit title | Key concept | Related concept(s) | Global context | Statement of Inquiry | Objectives | ATL skills | Content |
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| Interdependent Relationships in Ecosystems | Global Interactions | Environment, Balance, Consequences | Scientific and Technical Innovation | Environmental balance depends upon scientific and technical innovation by humans to prevent negative consequences and maintain positive global interactions among humans and the natural world. | C: Processing and Evaluating - All strands<br><br>D: Reflecting on the Impacts of Science - All strands | SOCIAL<br>● Collaboration<br>COMMUNICATION<br>● Communication<br>RESEARCH<br>● Information literacy<br>● Media literacy | HS-LS2-2.Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales<br>The response of an ecosystem to a small change might not significantly affect populations, whereas the response to a large change can have a large effect on populations that then feeds back to the ecosystem at a range of scales.<br>HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.<br>Describe* the system being impacted and how the human activity is affecting that system;<br>Describe* that the solution being refined comes from scientists and engineers in the real world who develop technologies to solve problems of environmental degradation.<br>Students describe* and quantify (when appropriate):<br>The tradeoffs in the solution, considering priorities and other kinds of research-driven tradeoffs in explaining why this particular solution is or is not needed. |
| Matter and Energy in Organisms and Ecosystems | Communities | Energy Environment | Globalization and Sustainability | Global communities interact with the natural environment through sustainable transfer of matter and energy. | A: Knowing and Understanding - all strands<br><br>B: Inquiring and Designing - all strands | SELF-MANAGEMENT<br>● Organization<br><br>THINKING<br>● Critical Thinking | LS2.B: Cycles of Matter and Energy Transfer in Ecosystems<br>Photosynthesis and cellular respiration are important components of the carbon cycle, in which carbon is exchanged among the biosphere, atmosphere, oceans, and geosphere through chemical, physical, geological, and biological processes<br>PS3.D: Energy in Chemical Processes<br>The main way that solar energy is captured and stored on Earth is through the complex chemical |

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| | | | | | | | process known as photosynthesis. |
| Sports Injury | Systems | Balance, Function | Identities/Relationships | The balance, structure, and function of systems influence health, well-being, and recovery from various injuries. | A: Knowing and Understanding -ALL STRANDS<br>D: Reflecting on the Impacts of Science -ALL STRANDS | ATL: Thinking Skills > Critical Thinking<br><br>ATL: Social Skills > Collaboration | -Properties of water<br>-Macromolecules<br>-Specialized Cells<br>-Hierarchical Organization -Homeostasis<br>-Feedback mechanisms |
| **Inheritance and Variation of Traits** | **Change** | Transformation,<br>Patterns | Identities and relationships – causation & correlation | There are both causational and correlational relationships that change structures which lead to transformations of patterns. | Criterion C: i. present collected and transformed data ii. interpret data and explain results using scientific reasoning<br>Criterion A: i. explain scientific knowledge ii. apply scientific knowledge and understanding to solve problems set in familiar and unfamiliar situations iii. analyse and evaluate information to make scientifically supported judgments.<br>Criterion D:<br>i. explain the ways in which science is applied and used to address a specific problem or issue ii. discuss and evaluate the various implications of the use of science and its application in solving a specific problem or issue iii. | ATL: Self Management Skills> Organization<br><br>ATL: Research Skills> Information Literacy<br><br>ATL: Research Skills> Media Literacy | LS1.A: Structure and Function<br>MYP Unit Planner, Draft for MYP the next chapter training<br>Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. LS1.B: Growth and Development of Organisms<br>In multicellular organisms 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 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. LS3.A:Inheritance of Traits Each chromosome consists of a single very long DNA molecule, and each gene on a chromosome is a particular segment of the DNA. The instructions for forming species' characteristics are carried in DNA. All cells in an organism have the same genetic content, but the genes used (expressed) by the cell may be regulated in different ways. Not all |

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| | | | | | apply scientific language effectively<br>iv. document the work of others and sources of information used. | | DNA codes for a protein; some segments of DNA are involved in regulatory or structural functions, and some have no known function.<br>HS-LS3-2. Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors. |
| Natural Selection and Evolution | Change | Form<br><br>Transformation | SCIENTIFIC AND TECHNICAL INNOVATION - How do we understand the world in which we live? | As the earth undergoes transformational changes due to human caused and natural processes, the types of organisms that can thrive also change form by adaptation. | OBJECTIVE A: KNOWING AND UNDERSTANDING<br>i. Explain scientific knowledge<br>ii. Analyse and evaluate information to make scientifically supported judgements<br>OBJECTIVE C: PROCESSING AND EVALUATING<br>i. Present collected and transformed data<br>ii. Interpret data and outline results using scientific reasoning<br>iii. Discuss the validity of a prediction based on the outcome of the scientific investigation<br>iv. Discuss the validity of the method | COMMUNICATION: Use appropriate visual representations of data based on purpose and audience.<br><br>RESEARCH: Information literacy & Media literacy | HS-LS4-1: Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.<br>HS-LS4-2: Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment .<br>HS-LS4-4: Construct an explanation based on evidence for how natural selection leads to adaptation of populations. (See DCIs for additional clarification)<br>HS-LS4-5: Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species |

**IB Subject Group: Sciences** **Course: Chemistry** **Year: 5**

| Unit title | Key concept | Related concept(s) | Global context | Statement of Inquiry | Objectives | ATL skills | Content |
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| Why are there so many elements ? | Relationships | Change, energy, atomic mass, analysis | Globalization and environmental impact | Matter throughout the Universe and our world is composed of elements, and these elements have an impact that goes beyond the scientific world. | Criterion B: Inquiring and designing<br>i) explain a problem or question to be tested by a scientific investigation<br>ii) formulate a testable hypothesis and explain it using scientific reasoning<br>iii) explain how to manipulate the variable and explain how data will be collected<br>iv) design scientific investigations<br><br>Criterion C: Processing and evaluating<br>i) present collected and transformed data<br>ii) interpret data and explain results using scientific reasoning<br>iii) evaluate the validity of a hypothesis based on the outcome of the scientific investigation | Research Skills<br>● Information Literacy/media literacy<br>Students will use the MYP command terms and use content vocabularies from NGSS curriculum as well as from online resources<br><br>Communication Skills<br>● Communication<br>Students will involve internet research/presentation and communicate with their peers and the class. | History of the Periodic Table design<br><br>Parts of an atom: neutrons, protons, and electrons.<br><br>Atomic structure and energy changes<br><br>Determining atomic mass<br><br>The Electromagnetic Spectrum<br><br>The processes of fission, fusion, and radioactive decay<br><br>Periodic Table trends<br><br>Law of Conservation of Mass<br><br>Chemical reactions: Ionic and Covalent bonding<br><br>Molecular shape and modeling |

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| | | | | | iv) evaluate the validity of the method<br>v. explain improvements or extensions to the method | | |
| How does water move matter? | Global Interactions | Consequences, Interaction, Models | Scientific and Technological innovation: Students will explore the natural world and its laws and the impact of scientific and technological advances on environments. | Innovations can mitigate the consequences of our interactions of Earth's water and the environment. | Criterion A: Knowing and Understanding<br>I. Explain Scientific Knowledge<br>Ii. Apply Scientific Knowledge and Understanding to solve problems set in familiar and unfamiliar situations<br>Iii. Analyze and evaluate information to make scientifically supported judgements.<br><br>Criterion D: Reflecting on the Impacts of Science<br>Iii. Apply Scientific Language effectively<br>Iv. Document the work of others and sources of information used. | Thinking skills<br>• Critical Thinking:Students are going to develop a claim on ways to mitigate sea level rise by citing three types of evidence in their reasoning as a critical thinking | Day 1-3: Molecules and their names<br><br>Day 4: Lewis Structures of Covalent Molecules<br><br>Days 5 - 6: Molecular Shapes (VSEPR)<br><br>Days 7-8: Phases of Matter<br><br>Day 9: Polarity of Molecules<br><br>Days 10 - 12: Interparticle forces<br><br>Days 13- 14: Thermal Expansion and Frost Wedging<br><br>Day 15- 18: "Like Dissolves Like"<br><br>Days 19: Is it a homogeneous or heterogeneous mixture?<br><br>Day 20: What is in a solution?<br><br>Days 21- 23: Acids and Bases<br><br>Days 24 -25: Properties of Solutions<br><br>Day 26-27: Investigation - Factors Affecting Sinkholes<br><br>Day 28: Causes of Sinkholes<br><br>Day 29: Groundwater Movement Interactive<br><br>Day 30: Background for Teacher |

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| Characterizing and Explaining chemical Reactions | Change | Balance, Energy, Interaction | Globalization and Sustainability | The interaction of molecules causes Changes that influence balance and energy within the global community. | A.i. Explain Scientific Knowledge<br><br>i. outline scientific knowledge<br>ii. apply scientific knowledge and understanding to solve problems set in familiar situations and suggest solutions to problems set in unfamiliar situations<br>iii. interpret information to make scientifically supported judgments.<br><br>D.i. explain the ways in which science is applied and used to address a specific problem or issue<br>D.iii. apply scientific language effectively<br>D.iv. document the work of others and sources of information used. | Research Skills<br>● Information Literacy/media literacy<br>Students will use the MYP command terms and use content vocabularies from NGSS curriculum as well as from online resources<br>Communication Skills<br>● Communication<br>Students will involve internet research/presentation and communicate with their peers and the class.<br>Thinking Skills<br>● Critical thinking<br>Students will use content-specific/ extended knowledge in order to build creative thinking power. | Conservation of Mass<br>Types of Reactions<br>Mole to Mass Conversions<br>Thermodynamics<br>Endothermic vs. Exothermic<br>Bond energy calculations<br>Collision Theory<br>Rates of chemical reactions<br>Separation of Mixtures<br>Equilibrium<br>Acid-Base Titration |
| Energy in Chemical | Relationships | Change, transfer, | Globalization and sustainability | The design of alternative fuel | Criterion B | Social<br>● Social skills | 1.Nuclear Processes and Radiation<br>2. Energy Transfer, Transformation and |

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| Processes and Everyday Life | | energy | | vehicles examines the relationship of energy, transfer and changes in the environment by using scientific reasoning and evaluating global impact. | Criterion D | | Conservation<br>3. Alternative Fuel<br>4. Human Use of Earth's Natural Resources |